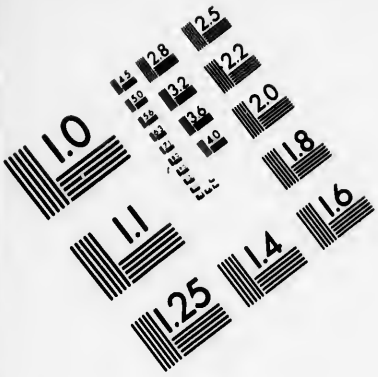

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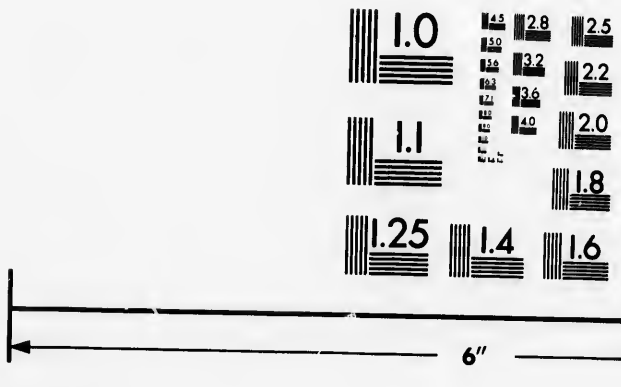

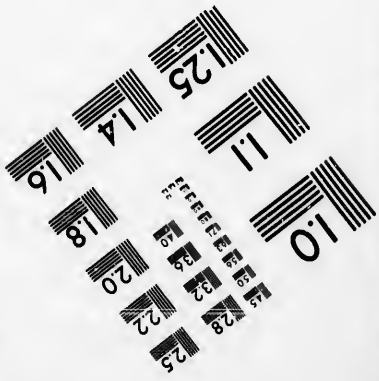

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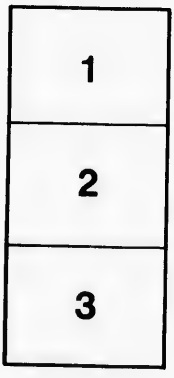

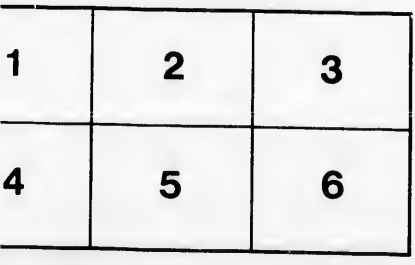

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EXAMINATION PAPERS

SUITABLE FOR

INTERMEDIATE EXAMINATION.

REPRINTED FROM

Gage's "School Examiner and Student's Assistant,"

FOR 1881. (VOL. I).

COMPILED BY

THOMAS KIRKLAND, M.A.,

Science Master, Toronto Normal School,

AND

WILLIAM SCOTT, B.A.,

Head Master, Toronto Model School.

TORONTO:

W. J. GAGE & CO., 11 WELLINGTON ST. WEST.

1882.

PREFACE.

In response to the desire of a large number of Teachers, we reprint the Examination Papers suitable for the Annual Intermediate Examination, which have appeared in the numbers, for 1881, of Gage's "School Examiner and Student's Assistant."

The steadily increasing circulation of this monthly magazine, and the numerous letters received testifying to the great value of the questions in the various subjects required for the Examinations, plainly indicate that such a periodical is a most useful aid to both teacher and student.

The almost exhaustive nature of the questions on each subject brings the student into close acquaintance with every needful point; and the drill experienced in thinking and working out the answers is of incalculable practical benefit to those who wish to excel at written examinations.

When we state that the editors of this department of the *School Examiner* are Messrs. T. Kirkland, M.A., and W. Scott, B.A., we consider that it is a sufficient guarantee for the excellence and appropriateness of the work, as these gentlemen have earned a wide reputation as specialists in science and literature.

In consequence of numerous applications for the French Paper given at the Intermediate Examination, 1880, we reproduce it in this book.

HINTS AND ANSWERS to the mathematical subjects, and some others, are published in a separate book.

April, 1882.

CONTENTS.

EXAMINATION PAPERS.

SUITABLE FOR

THE INTERMEDIATE EXAMINATION.

Arithmetic.--No. 1.

1. *A* and *B* begin business together; *A* gives $\frac{3}{5}$ of the capital. At the end of the first year they have made a net profit of $3\frac{1}{2}$ %; at the end of the second a net profit of 5 %; at the end of the third they are bankrupts and can only pay 50 cents in the dollar. The remaining money is $21,735; how much did each contribute?

2. *A*'s income from money invested in Dominion five per cent. stock is $1200; he sells out at $101\frac{3}{8}$ and invests in four per cent. stock at $80\frac{7}{8}$. How will his income be affected, brokerage on each transaction being $\frac{1}{8}$ %?

3. The diameter of the fore wheel of a carriage is 3 feet 6 inches, and that of the hind one 6 feet 2 inches. If two nails, on the outside of each wheel, touch the ground together, in what time will they do so again, allowing the circumference to be $3\frac{1}{7}$ times the diameter, and the rate of travelling $6\frac{1}{2}$ miles an hour?

4. Simplify $\dfrac{\sqrt[3]{1{\cdot}92} - 24\sqrt[3]{{\cdot}00004562625}}{\sqrt[3]{{\cdot}81} + \sqrt[3]{{\cdot}03}}$

5. What is the weight of a cylinder of iron closed at both ends, 18 in. in diameter and 3 ft. 2 in. long, the iron being 1 inch thick, it being known that the sp. gr. of iron is 7.7 and a cubic foot of water weighs 1000 oz. ?

6. What per cent. payable quarterly is exactly the same as 8 % payable annually ?

7. Sent my agent 5000 bu. of wheat which he sold at $1.20 per bu. on a certain commission. He invested the balance, after deducting his 2 coms., in silks ; the second com. was at the rate of 4 %. If the two coms. amounted to $500 at what rate % was the first charged ?

8. The ready money price of a book at a bookseller's who allows mercantile discount for ready money is $4.50 and the credit price $4.75 ; what ought the credit price to be in order that, while charging the same ready money price, he may allow twice the rate of discount ?

9. Two trains, 120 ft. and 150 ft. long respectively, are moving with uniform velocities on parallel rails in opposite directions and are observed to pass each other in 3 seconds ; but when they are moving in the same direction their velocities being the same as before, the faster is observed to pass the other in 10 seconds, find the rate in miles per hour at which each train moves.

10. What vulgar fractions are reducible to terminating decimals ? Before reducing a fraction to a mixed repetend how can the number of places in the finite part of the repetend be determined without dividing ? Assuming the rule for reducing a pure repetend to its equivalent fraction, investigate the process for reducing a mixed repetend to a fraction.

Arithmetic.—No. 2.

1. Define notation. Enumerate the points of difference between the Roman and Arabic systems of notation. What is the difference between an English billion and our billion?

2. What two methods are employed to find the discount of a sum of money? Which method is adopted by mercantile men? Why is it wrong in principle? If the mathematical discount on $220, for a certain term and rate, is $20, what is the mathematical discount on $220 for twice the time?

3. Bought a quantity of wheat. Sold it all at $1.20 per bu., on half of it I gained 20 per cent., and on the rest I lost 20 per cent., find my net gain or loss per cent.

4. *A* divided his property among his three sons and two daughters as follows:—To the eldest son he gave $\frac{1}{2}$ of the whole, less $12000; to the second $\frac{1}{3}$ of the remainder and $6000; to the third $\frac{2}{3}$ of what then remained, less $2000; and he divided what now remained equally between his daughters; if a daughter's share was $6000 find the shares of each son.

5. *A* bought a rectangular field 48 rods long for $500; *B* bought a field similar in shape to *A*'s for $320; if the land in each case was of the same value, what was the length of *B*'s field?

6. A friend lent me $3955 at 7%; to raise the money he sold out Dominion 5% stock when it was at $99\frac{3}{8}$; I kept the money six months, and meanwhile the Dominion fives fell to 97. How much had I to pay my friend to cover the interest and to replace the stock he previously held; brokerage upon each transaction $\frac{1}{2}$ per cent.?

7.

$760. *November 30th, 1880.*

Three months from date I promise to pay to *A B*, or bearer, the sum of $760 with interest at the rate of 7% per annum, for value received.

C. D.

The above note was discounted at the Ontario Bank on December 28th, and *A B* received $759.78 for it. What per cent. per annum did the banker charge?

8. A cistern has three supply taps, *A*, *B*, and *C*, and two by which it is emptied, *D* and *E*. *A* and *B*, running together, can fill it in 6 hours; *B* and *C* in 8 hours; *A* and *C* in 10 hours; *A* and *D* in 60 hours, and *B* and *E* in 120 hours. If all the taps are opened at once, and the cistern empty, in what time will it be filled?

9. Find the edge of the largest cube that can be cut from a sphere of wood 12 inches in diameter; and what would the cuttings weigh, the specific gravity of the wood being .657, and a cubic foot of water weighing 1000 ounces?

10. A person, trotting at the rate of 10 miles an hour, directly towards a spot where minute guns are being fired, noticed exactly 18′ 45″ between the first and twentieth reports. What is the velocity of sound?

Values.—10 marks to each question.

No. 3.

1. What is meant by decimal notation?

Write 7.00100200.31 in words, and express seventeen, and one million eight thousand and six ten-trillionths in figures.

2. Define Measure, Multiple, Common Measure, and Least Common Multiple. The prime factors of the first of three members are 2^3, 3^2, 5, 11, and 13; of the 2nd, 2^2, 3, 5^2, 13, and 23; if the L. C. M. of these three numbers is 171685800, what must be one of the prime factors of the third number? Why cannot numbers have a greatest common multiple?

3. *B* sold a farm to *C* at a loss of 15 per cent.; *C* sold it to *D* at a loss of 10 per, cent; *D* sold it to *F* at a gain of 10 per cent for $3786.75. What did the farm cost *B*?

4. *A*, *B*, *C*, entered into partnership for 18 months. *A* put in $400, *B* put in $500 and *C* $900; at the end of 10 months each drew out $200. At the end of the year, *A* and *B* each put in an amount, so that at the close of the partnership out of a gain of $1710, *A* got $430 and *B* got $550. What sums did *A* and *B* put in?

5. The price of standard silver is 5s. 2d. per oz, the duty on manufactured silver is 1s. 6d per oz., and the cost of workmanship is 1s. 4d. per oz. If a dozen silver forks are sold for £12 3s. and the silver-smith makes 12½ per cent. on the transaction, how many ounces of silver are there in one of the forks?

6. A tradesman professes to retail his goods at 10 per cent. profit, but adulterates them by adding ¼ of their weight of an inferior article, which cost him four-fifths of the price of the better. How much per cent. profit does he make? In what proportion must he mix the two kinds so as to gain 20 per cent?

7. Two circular gold plates each 1 inch thick, of which the

diameters are respectively 6 and 8 inches, are melted into one plate an inch thick ; find its diameter.

8. The amount of a certain principal, in a certain time at 8% is \$950. and for the same time at $10\frac{1}{2}\%$, the amount is \$1012.50. Find the principal and the time, the money being loaned at simple interest.

9. A speculator loses $\frac{1}{4}$ of his money and then gains \$14 ; he then loses one-fifth of what he now has, and gains \$8, when he retires as he began. What had he at first ?

10. Find in two ways the sixth root of 1061520150601.

Value—10 marks to each example.

No. 4.

1. Simplify $\left\{ \dfrac{2\cdot3 \text{ of } \dot{2}8\dot{5}7\dot{1}\dot{4}}{1\cdot1} \div \cdot7\dot{4}\dot{1}\dot{5} \right\} \times \left[\left\{ \dfrac{2\frac{1}{2}}{16} + \dfrac{3\frac{1}{2}}{12} \text{ of } 3\frac{1}{4} - \left(\frac{7}{16} \text{ of } 1\frac{16}{21} - \frac{1}{6}\right) \right\} \div \left(\frac{1\frac{1}{2}}{14} - \frac{3}{7} \text{ of } \frac{1}{8}\right) \right]$

Give the answer in a vulgar fraction in its lowest terms.

2. If 5 men, 4 boys, and 3 girls can clear a field of stones in 9 days ; and 8 boys, 6 girls, and 3 men can do it in 8 days ; and 10 boys, 9 girls, and 4 men can do so in 6 days, how long will it require 3 men, 5 boys, and 4 girls to do it ?

3. A person bought a sewing-machine, bearing a duty of $33\frac{1}{3}\%$, and sold it at a loss of 10 per cent. Had he sold it for $\$10\frac{2}{3}$ more he would have cleared 10 per cent ; what did the machine cost him at the manufacturer's ?

4. *B* dying left \$31450 to be divided among 4 children

and 5 brothers, so that after paying the legacy duty, each child shall have twice as much as a brother. The duty on a child's share is 2% and on a brother's 4%. Find the share of each.

5. Bought 2000 lbs of sugar, part at 7 cents per pound and the rest at 10 cents per pound. Had I bought the whole at 8 cents per pound it would have cost me $13 less than I paid for it; how many pounds of each kind did I buy?

6. Explain the following quotations from the *Globe* of March 26. "United States $4\frac{1}{2}$'s, $114\frac{3}{4}$." "The posted rates of sterling exchange are unchanged at $\$4.80\frac{1}{2}$ for 60-day bills, and $4.83 on demand. "Drafts on New York firm, at $\frac{3}{8}$ to $\frac{1}{2}$ premium." "Commerce sold at 142 for 25 shares."

7. A note of $400, due in one year from April 12, 1880, was bought July 12, 1880, for $390 what rate of interest does the buyer realize on his money, the note bearing interest at the rate of 10%?

8. If *B* invests $6135 in the Dominion 5 per cents, at $101\frac{3}{4}$ paying $\frac{1}{2}$ per cent. brokerage, and after receiving a yearly dividend sells out at par, again paying $\frac{1}{2}$ per cent. brokerage, does he gain or lose by the transaction, and how much, money being worth 7 per cent?

9. If the French 3 per cents are at 60 when the English are at 95, the exchange between the countries being 25 fr. per £1, how much French stock in francs can be bought by selling £6000 out of the English funds, brokerage on each transaction $\frac{1}{4}$ per cent?

10. *A* and *B*, starting at opposite corners of a square whose side is 100 yards long, walk round it in the same direction; *A* walks 19 yds. while *B* walks $16\frac{2}{5}$ yds. At what part of the square will they be first together, and how many times will each have passed the corner where he started?

Value—10 marks each.

No. 5

1. Simplify $\frac{\sqrt[3]{3.43} + \sqrt[3]{.0274}}{\sqrt[3]{270} - \sqrt[3]{.08}}$,

and $\frac{(.075)^3 + (.025)^3}{(.075)^2 - (.075)(.025) + (.025)^2}$

2. Define the following:—*Fraction., terms of a fraction, simple fraction, complex fraction,* and *decimal fraction.* Explain how to reduce vulgar fractions to decimal fractions. How can you tell before performing the operation whether the decimal will be a repetend or a terminating decimal?

3. Some smugglers found a cave which would exactly hold the cargo of their boat, viz., 18 bales of silk and 40 casks of wine. While unloading, a revenue cutter came in sight, and they were obliged to sail away, having landed only 21 casks and 12 bales, and filled $\frac{3}{5}$ of the cave. How many bales separately, or how many casks would it hold?

4. A merchant bought 5600 bushels of wheat and sold $\frac{1}{5}$ of it at a profit of 5 per cent., $\frac{1}{4}$ of it at a profit of 7 per cent., and the remainder at a profit of 12 per cent. Had he sold all at a profit of 9 per cent, his gain would have been $24.50 less; what did the wheat cost him?

5. *B* bought goods amounting to $375, and not having the money, gave a note for 3 months, which discounted at the bank at 8 per cent. per annum, just paid for thegoods. He allowed the note to be protested and gave another note for 3 months which discounted at 8 per cent. covered the previous note and the cost of protest ($1.75); what was the face of the second note?

6. The true discount on an entire sum of money at 6 per cent. is $50 more than the sum of the true discounts on one-half the sum at 8 per cent. and on the other half at 4 per cent. Find the sum.

7. A foreign Government contracts for three loans in different markets; the first, a five per cent. loan for £20000000;

the second, a 4 per cent. loan for £12000000; the third, a $3\frac{1}{2}$ per cent. loan for £10000000. For the first the Government received £80, for the second £70, and for the third £60 for every £100 of stock. How much money is realized from these loans, what average rate of interest is paid on the money actually received, and on which of the three loans does the Government pay the lowest rate?

8. Explain the principle on which we place a point over every third figure in the cube root, and show that the number of figures in the root will be equal to the number of these points.

9. The price of gold is £3 17s $10\frac{1}{2}$d per oz; a composition of gold and silver weighing 18 lbs is worth £637 7s., but if the proportions of gold and silver were interchanged it would be worth only £259 1s. Find the proportion of gold and silver in the composition, and the price of silver per oz.

10. The section of a telegraph cable is half an inch in diameter, the central wire is one-eight of an inch in diameter, and there are 3 protecting wires of one-sixteenth of an inch section embedded in the hempen cable; what precentage of the cable consists of metal and what of hemp?

No. 6.

1. Assuming the rule for reducing a pure repetend to its equivalent vulgar fraction, show how to deduce from this the rule for reducing a mixed repetend to its equivalent fraction.

Simplify

$$\left\{\frac{3.5 \text{ of } 5.625 \quad 2.1\dot{8} \text{ of } .9\dot{1}\dot{6}}{2.8\dot{3} \text{ of } 3.\dot{2} \quad 3.1 \text{ of } 7.7\dot{1}4285\dot{7}}\right\} \text{of} \frac{7\text{s. } 1\text{d}}{6\text{s. } 0\text{d}} \text{ of} \frac{2\text{ft. } 8\text{in.}}{2\text{ft. } 11\text{in.}}$$

2. A person remarked that when he counted over his basket of peaches, two by two, three by three, four by four, five by five, or six by six, there was some remaining; but when he counted them by sevens there was no remainder. Find the least number he had.

3. *A* draws off 6 gallons from a 20 gallon cask of brandy, and fills the cask up with water. He then draws off 6 gallons, and fills the cask as before. After he has done this 4 times, what will be the strength of the remainder?

4. A person invests in the U. S. four per cents so as to obtain 4 per cent. clear on his investment after paying an income tax of 1 per cent. What percentage would he obtain if the tax were doubled?

5. A manufacturer's employes consist of men, women, and boys. A man receives $1.50 per day; a woman 50 cts; a boy 75 cts. If the amount of wages paid to the whole is the same as if each received $1.10 per day and there are 16 boys, how many employes are there altogether?

6. Two women in the habit of buying between them 120 oranges a day at 3d. per dozen, and selling them at 5 for 2d., club together, and one taking the better half sells them at 2 for 1d., and the other selling the remainder at 3 for 1d. How much are they better off at the end of six days' traffic, and what percentage of increased profit do they make by the plan?

7. A watch which gains 1 min. 12 sec. per day is set right at noon on November 11th. What is the true time when this watch points to noon on the following Christmas-day?

8. A man embarks his property in four successive ventures. In the first he clears 100 per cent., and in each of the others he loses the same per cent. If there remains to him 2.4 per cent on his original outlay, what was his loss per cent. in each of the three years?

9. A crown made of gold and silver weighs 150 oz., and displaces 13.824 cubic inches of water. Had it been of pure gold, it would have displaced 12.96 cubic inches of water; and had it been of pure silver it would have displaced 23.04 cubic inches. Find the weight of gold, and of silver in the crown.

10. A grain of gold is beaten so thin as to cover 80 square inches; find the cost of the gold required to cover the curved surface of a cylinder $10\frac{1}{2}$ feet long, and the end of which has a radius of 4 inches, if an ounce of gold is worth $17.50.

No. 7.

NOTE.—*This paper is intended to embrace the work to the end of decimals.*

1. Define the following terms, giving an example of each: abstract number, notation, prime number, multiple, and complex fraction.

2. Explain why the multiplier must always be regarded as an abstract number.

3. Divide 786949 by the factors of 105, and show clearly how the correct remainder is obtained.

4. Distinguish between vulgar and decimal fractions, and between simple and compound fractions.

5. Explain the use of the cipher in Arabic notation, and express in figures seventy quadrillions seventy thousand, and seventy million and seven ten-billionths.

6. Show that if the three right hand figures of a number be divisible by 8 the number itself will be divisible by 8.

Resolve the numbers 3384, 8272, and 7567 into their prime factors, and from these determine the H. C. F. and L. C. M. of these numbers.

The Least Common Multiple of two numbers is 8286604200; their Greatest Common Measure is 32340, and one of the numbers is 2522520; find the other.

7. Assuming the rule for reducing a pure repetend to its equivalent vulgar fraction, show how to deduce a rule for reducing a mixed repetend to its equivalent fraction.

What must be the denominators of those fractions which on being reduced to decimals give pure repetends of *three* figures? Why?

8. Compare the speed of two steamers, one of which sails $264\dot{3}$ miles in $23\frac{5}{8}$ hrs., and the other $89{\cdot}5$ miles in $6{\cdot}3\dot{2}$ hrs. If the speed of the slower be represented by 12, what number will represent the speed of the faster?

9. (*a*). Simplify $\left\{ \cdot\dot{0}76923 \text{ of } \frac{3\frac{1}{4}+2\frac{1}{5}}{\cdot 01} \div \left(\cdot\dot{4}2867\dot{1}+\frac{4}{7}\right) \right\} \times \left\{ \frac{35}{57} + \frac{\cdot 00\frac{2}{3}}{7} \div \frac{\cdot 003\frac{1}{3}}{21} \right\}$

(*b*). Simplify

$$\frac{3 \text{ mi. } 3 \text{ fur. } 3 \text{ in.}}{4 \text{ mi. } 4 \text{ fur. } 4 \text{ in.}} + \frac{£8\ 8s.\ 8d.}{£9\ 9s.\ 9d.} - \frac{2t.\ 2qr.\ 2oz.}{4t.\ 4cwt.\ 4dr.}.$$

10. (*a*). Find the value of $1 + \frac{1}{1\cdot 2} + \frac{1}{1\cdot 2\cdot 3} + \frac{1}{1\cdot 2\cdot 3\cdot 4} + \ldots$ correct to 6 decimal places.

(*b*). A lady went shopping with a certain sum of money in her purse; at the first store she spent \$2.30 more than $\frac{2}{5}$ of her money; at the next store she spent \$1.30 less than $\frac{3}{8}$ of what money she then had; at the next place of call she spent \$3.55 less than $\frac{6}{7}$ of what money she now had. She finds that she has now $\frac{1}{5}$ of her original sum of money left. How much had she at first?

No. 8.

1. Define the following terms, giving an example of each: odd number, composite number, submultiple, compound number, and aliquot part.

2. State clearly wherein the compound differ from the simple rules, illustrating your answer by examples.

To which kind of addition does the following example belong: Find the sum of £368, £469, and £251? Why?

3. Multiply 7689748 by 999993, using only two products to obtain the correct result. State why your process must give the correct result.

4. (*a*) Why do the following fractions produce terminating decimals: $\frac{3}{4}$, $\frac{7}{40}$, $\frac{9}{200}$?

(*b*) What kind of decimal must the following produce: $\frac{7}{8}$, $\frac{7}{24}$, $\frac{11}{15}$, $\frac{17}{63}$? Give your reason in each case.

(*c*) In reducing the following how many places of decimal must there be before the decimal begins to repeat: $\frac{5}{36}$, $\frac{7}{375}$, $\frac{9}{64}$, $\frac{17}{176}$? Why?

5. (*a*) Simplify $\left(\frac{\cdot0075\times2\cdot1}{\cdot0175}+\frac{4\cdot255\times\cdot0064}{\cdot00032}\right)^2$

(*b*) Find the sum, difference, product, and two quotients of 10·01 and ·0091.

6. On the first of January, 1880, *A* borrowed \$400 at a certain rate per cent.; three months afterwards he borrowed \$300 at twice the former rate; and on the first of October he borrowed \$1000 at half the rate paid for the first loan. He settles for these different loans on 1st January, 1881, by paying away \$1778. At what rate was the first sum borrowed?

7. (*a*) Explain the distinction between True Discount, Bank Discount, and Mercantile Discount.

(*b*) *A* bought a buggy for $175 and gave a note for three months which discounted at the Ontario Bank at 7% just paid for the buggy. For what amount was the note drawn?

8. A person has an income of £122 10s. for $3\frac{1}{2}$ per cent. consols; he sells at 92, and invests his principal in stock at 95; his new income is £177 18s. $5\frac{1}{10}$d.; what rate did his new stock yield?

9. *A* had a six per cent. bond of $800 dated January 1, 1881, and due January 1, 1882. On July 1, 1881, *A* sold the bond to *B* in such a way as to give *B* 7% on his investment. If *B* borrowed the money needed to pay *A* from the Dominion Bank at 8% on a note for 90 days, what was the face of the note?

10. (*a*) Explain the difference between 7 ft. sq. and 7 sq. ft.

(*b*) A rectangular park, one side of which is twice as long as the other, contains 500 acres; there is a road running round its outside which contains 32900 sq. yards. How wide is the road?

No. 9.

1. (*a*) Define the following terms: Brokerage, average, insurance, stock.

(*b*) *A* sent a sum of money to his agent in Montreal, with instructions to deduct his commission at $2\frac{1}{2}$ per cent., and invest the balance in silks. The agent's commission was $240; what sum was sent?

2. Multiply 96879364852 by 144121728, using only three partial products. Show that your method must give the correct result.

3. (*a*) What is Practice? What principle in multiplication is often apparently violated by this rule?

(*b*) Find the price of 364t. 17cwt. 3qrs. 10lbs. of steel at $40 per ton, by Practice.

4. Explain the following quotations: "Montreal Bank sold at 202 for 60." "Dominion Government 5's were wanted at $99\frac{3}{4}$ without sellers." "The posted rates of sterling exchange are unchanged at $4.80 for 60-day bills, and $4.84 on demand."

5. *A*, *B*, and *C* do a piece of work for $159.70; on the supposition that *A* and *B* do $\frac{3}{4}$ of the work, *A* and *C* $\frac{9}{10}$, and *B* and *C* $\frac{13}{20}$, what should each receive?

6. A merchant bought cloth $1\frac{3}{4}$ yards wide at $5.70 per yard; the cloth getting wet shrunk 5 per cent. in length and $2\frac{1}{2}$ per cent. in width; at what price per square yard must he sell it so as to gain 20 per cent?

7. A bank, by discounting a note at 8 per cent., received for its money a discount equivalent to $8\frac{1}{2}$ per cent. interest; for what length of time was the note discounted before it was due?

8. *A* invests 30 per cent. of his capital in 4 per cent stock at 90, 38 per cent. of it in $4\frac{1}{2}$ per cent. stock at 95, and the rest of it in 6 per cent. stock at 105; his total income is $\$1736\frac{2}{3}$; find the amount of his capital.

9. (*a*) What is the course of exchange? The par of exchange?

(*b*) Sold a bill of exchange on London, for £450, to a broker in Toronto, who charged me $\frac{1}{2}$ per cent. brokerage. If I received $2169.10 for it, how was sterling exchange quoted?

10. A solid ball, 4 inches in radius, of a certain material weighs 8 lbs.; what is the thickness of a spherical shell of the same material weighing $7\frac{5}{8}$ lbs., the external diameter of which is 10 inches?

Algebra.—No. 1.

1. Define and apply, by examples, the following terms :— Independent equations, symmetrical quantities, homogeneous quantities, like dimensions.

Simplify $ab-[(a+c)b-3ac-\{ab-2c(a-b)\}]$.

2. Examine the principles upon which the rules of addition and subtraction of algebraical quantities are founded.

Add together $4(x^2-\frac{y^2}{5}-2xy)$ and $\frac{xy}{3}-7\left(x^2-y^2-\frac{xy}{5}\right)$.

3. Give a definition of multiplication which will apply to fractions.

Perform the following multiplications :—

(1). $(x^2-2x+3)(x^2+2x+3)$.
(2). $(x^m-2y^n)(x^m-y^n)$.
(3). $(x^{m^2}+ax^m-b)(x^{m^2}-ax^m+b)$.
(4). $(a^{\frac{1}{2}}+b^{\frac{3}{5}})^2(a^{\frac{1}{2}}-b^{\frac{3}{5}})$.

4. Perform the following divisions :—

(1). $(12x^4-192)\div(3x-6)$.
(2). $(2{\cdot}091x^3+9{\cdot}22x^2+3{\cdot}694x-1{\cdot}2)\div(\cdot51x+2)$.
(3). $(x^6+x^{-6}-2)\div(x^2+x^{-2}-2)$.

5. State and prove Horner's method of division, and apply it to the following :—

$$(a^6 - 4a^4 + 7a^3 - 5a + 6) \div (a^2 + 5a - 4).$$

6. Define the terms "Measure" and "Greatest Common Measure." State and prove the rule for finding the greatest common measure of two compound algebraical expressions. Find the G. C. M. of the quantities :

$$x^4 + 4(x^3 - 30) - x(18x + 104), \text{ and}$$
$$x^4 - 10(x^3 + 12) + x(24x + 36).$$

7. Investigate a rule for finding the square root of a compound algebraical quantity, and find the square root of

$$x^{6p} + 9x^{-6p} - 4x^{4p} + 4(x^{2p} - 3x^{-2p}) + 6.$$

8. State the principles, or axioms, used in the solution of equations.

Solve the following equations :—

(1). $$\frac{x - 1}{x^{\frac{1}{2}} + 1} = 4 + \frac{x^{\frac{1}{2}} - 1}{2}.$$

(2). $$x(bc - xy) = y(xy - ac)$$
$$xy(ay + bx - xy) = abc(x + y - c).$$

(3). $$\frac{7 + x}{7 - x} + \frac{7 - x}{7 + x} = \frac{29}{30}.$$

9. Two persons A and B, can perform a piece of work in 16 days. They work together for 4 days, when A being called off, B is left to finish it, which he does in 36 days more; in what time would each do it separately ?

Algebra.—No. 1.

1. Define the meaning of a^m; shew that $a^m . a^n = a^{m+n}$.

Prove that $a^0 = 1$, and $a^{\frac{1}{m}} = \sqrt[m]{a}$. Is any assumption necessary in order that this may be true?

2. Examine for what values of n, $x^n + (-y)^n$ is exactly divisible by $x \pm y$.

The product of any three consecutive integers being formed, and also the product of any other three, the difference of these products will always be exactly divisible by the difference of the middle integers of the two sets.

3. Multiply $x+a$, $x+b$, $x+c$, $x+d$ together, and deduce from the product the coefficient of x in the product $(x+2)(x+6)(x+10)(x+14)$.

4. If $x^3+y^3+z^3 = x^2+y^2+z^2 = x+y+z = 1$, then will $xyz = 0$.

5. Divide $(ax+by)^2 + (cx+dy)^2 + (ay-bx)^2 + (cy-dx)^2$ by x^2+y^2.

6. In the process for finding the highest common divisor of two algebraical expressions, show that the result is not affected (1) by removing any factor which is common to every term of a divisor at any stage of the operation which is not found in every term of the corresponding dividend; (2) by introducing into any dividend a factor which is not contained in every term of the corresponding divisor.

Find the highest common divisor of

$$a^3+b^3+c^3-3abc \text{ and } a(a+2b)+b(b+2c)+c(c+2a).$$

Algebra.—*Continued.*

7. State the meaning of the symbol $\frac{a}{b}$, and show that its value is unaltered by multiplying or dividing both terms by the same quantity. Also, examine how the value is affected by increasing or diminishing both terms by the same quantity.

Prove that $\frac{(a+b)(a+c)}{(a-b)(a-c)}+\frac{(b+c)(b+a)}{(b-c)(b-a)}+\frac{(c+a)(c+b)}{(c-a)(c-b)}=1.$

8. Is there any fallacy in the following? if so point it out.

(1) $a(a-a)=a^2-a^2=(a-a)(a+a)$.

Dividing by $a-a$, we have $a=a+a=2a$; $\therefore$ $1=2$.

(2) If $a^0=1$ and $b^0=1$, $\therefore$ $a^0=b^0$, and consequently $a=b$.

9. What is the distinction between an equation and an identity?

To which class, having regard to x, does the following belong:

$$\left(x+\frac{5a}{2}\right)\left(x-\frac{3a}{2}\right)+ax=(x+5a)(x-3a)+11\tfrac{1}{4}\,a^2\,?$$

10. Solve the following equations:

(1) $(a+x)^3+(b+x)^3+(c+x)^3=3(a+x)(b+x)(c+x)$.

(2) $\frac{b^2-c^2}{x-a}+\frac{c^2-a^2}{x-b}+\frac{a^2-b^2}{x-c}=0$

(3) $\frac{x-b}{x-a}+\frac{x-a}{x-b}=\frac{x+b-2a}{x+a-2b}+\frac{x+a-2b}{x+b-2a}$.

(4) $\frac{x+y-z}{b+c}=\frac{y+z-x}{c+a}=\frac{z+x-y}{a+b}=a+b+c$.

(5) $x^3+\frac{64}{x^3}=7x^{\frac{3}{2}}+\frac{56}{x^{\frac{3}{2}}}+2$.

Algebra.—No. 3.

1. Show that $a^m - a^n$ is divisible by $a+1$ when $m-n$ is even; that a^m+a^n is divisible by $a+1$ when $m-n$ is odd; and that $a^m - a^n$ is divisible by $a-1$ when $m-n$ is even or odd.

2. What is the criterion by which it is known that an algebraical polynomial, with integral co-efficients, and arranged according to descending powers of x, is divisible (1) by $x+1$, and (2) by $x-1$? Show that $x^5+3x^4-x^3-x^2-2$ is divisible, both by $x+1$ and by $x-1$, and write the quotient.

3. Explain how the highest common divisor of two algebraical expressions does not always give the greatest common measure of the numbers which result, when particular numerical values are given to the algebraical symbols.

Exemplify in finding the highest common divisor of x^4-x^2-2x-1, and $x^4+2x^3+x^2-1$; and of $3x^2+ax-4a^2$ and $6x^3-7ax^2-20a^2x$; and their greatest common measures, when $x=4$ and $a=1$.

4. Show that $\dfrac{(2b-c-a)^3-(2c-a-b)^3}{(c-a)^3-(a-b)^3}=\dfrac{9(b-c)}{b+c-2a}$.

5. Extract the square root of $\dfrac{a^2}{9}-\dfrac{2ax}{21}+\dfrac{x^2}{49}-\dfrac{ay}{6}+\dfrac{xy}{14}+\dfrac{y^2}{16}$, and explain why, if the terms be arranged in the reverse order, and the root be then extracted, a result will be obtained differing only in the sign of the whole quantity from that obtained in the first instance.

Algebra.—*Continued.*

6. Show that the square of the sum of any two consecutive numbers is equal to four times their product, increased by unity; and apply this principle to find the squares of the odd numbers 19 and 23.

7. What is meant by the root or roots of an equation? Solve the equations:

$$\frac{a\left\{m-(x-n)\right\}}{b}=\frac{b\left\{n-(x-m)\right\}}{a} \text{ and}$$

$$\frac{3\left\{5-(x-4)\right\}}{71}=\frac{71\left\{4-(x-5)\right\}}{3}$$

and show that if, in the former of these, a and b be equal, x may have any value whatever; but that if a and b be unequal, x has only one and the same value, whatever unequal values a and b may have.

8. Solve the following equations:

(1) $\dfrac{(x+a)(x+b)}{x+a+b}=\dfrac{(x+c)(x+d)}{x+c+d}$.

(2) $ax+cy+bz=cx+by+az=bx+ay+cz=a^3+b^3+c^3-3abc$.

9. If capital be invested in the four per cents at 96, and in the 5 per cents at 105, how much must be invested in each stock so as to realize $4\frac{1}{2}$ per cent. on the capital invested?

10. Solve $\dfrac{ax-bc}{x+b}+\dfrac{bx-ca}{x+c}+\dfrac{cx-ab}{x+a}=0$, when $a+b+c=0$.

Algebra.—No. 4.

1. Show by means of division if $x^2+axy+y^2+bx+cy$ is resolvable into two rational factors, that $abc=b^2+c^2$.

2. Divide $x^5-px^4+qx^3-rx^2+sx-t$ by $x-a$ as far as five terms of the quotient, and prove the correctness of the quotient by multiplying the divisor and quotient together, and adding the remainder.

Also write quotient and remainder (if any) when $x^5-8x^4+12x^3-18x^2+20x-30$ is divided by $x-4$.

3. Show that ax^5+bx+c and $a+bx^4+cx^5$ have a common quadratic factor if $b^2c^2=(c^2-a^2+b^2)(c^2-a^2+ab)$.

4. In what respect do Algebraical fractions differ from Arithmetical fractions?

Explain how a meaning is given to the process of multiplying two fractions together.

5. Determine the highest common factor and reduce to its lowest terms, the following fraction:

$$\frac{a^2(b^2-c^2)-ab(2b^2+bc-c^2)+b^3(b+c)}{a^3(b^2+2bc+c^2)-a^2b(2b^2+3bc+c^2)+ab^3(b+c)}.$$

6. Show that the sum of every fraction and its reciprocal is greater than 2, and that

$$\frac{a}{b}+\frac{b}{c}+\frac{c}{d}+\frac{c}{b}+\frac{b}{a}+\frac{d}{c}>6.$$

7. What relations must subsist between a, b, c, in order that ax^2+bx+c may be a complete square?

If $ax^4+bx^3+cx^2$ be subtracted from $(x^2+2x+4)^3$, and the remainder be a perfect square; determine the values of a, b and c.

8. In the product of $(x+a)(x+b)(x+c)$, the co-efficient of x^2 vanishes, and in the product of $(x-a)(x+b)(x+c)$ the co-efficient of x vanishes, and the co-efficient of x in the former is that of x^2 in the latter; find a in terms of b and c.

9. In solving the quadratic equation $x^2-4x+2=0$; take every step in order, and describe the process leading to the

result in plain and intelligible language.

Under what circumstances will a quadratic equation have only one root?

10. Solve the equations=

(1.) $(x+3)^3-3(x+2)^2+3(x+1)^3-x^3=x+15.$

(2.) $(7-4\sqrt{3})x^2+(2-\sqrt{3})x=2.$

(3.) $\left.\begin{array}{l}(x^3+y^3)-9(x+y)=-6.\\ x^2y+xy^2\quad\quad=2.\end{array}\right\}$

Mc. 5.

1. "To multiply two unequal numbers. Take the sum of the two numbers and multiply half of it into itself. From this product subtract the square of half the difference of the two numbers." Give the Algebraic formula which expresses this rule, and state in words at length in the simplest form.

2. Show that $(3x^2-4x+2)^2-(2x^2+9x+3)^2$ is divisible by x^2+x+1 without performing the operation of division.

3. Show that $x^n-na^{n-1}x(n-1)a^n$ is divisible by $(x-a)^2$ without performing the operation, and write the exact quotient of $x^5-5a^4x+4a^5$ divided by $(x-a)^2$.

4. Show that the highest common divisor of two compound Algebraical quantities is the least common multiple of all the common divisors.

5. Show that if $x+c$ be the highest common factor of x^3+ax+b, and x^2+mx+a, their least common multiple is $x^3+(a+m-c)x^2+(am-c^2)x+(a-c)(m-c)c$.

6. Show that $\frac{(ac+bd)^2}{(a^2+b^2)(c^2+d^2)}$ is always a proper fraction.

7. Reduce to its simplest form

$$\frac{(x-b)(x-c)}{(a-b)(a-c)}+\frac{(x-c)(x-a)}{(b-c)(b-a)}+\frac{(x-a)(x-b)}{(c-a)(c-b)}$$

9. Solve the equations :—

(1) $$\frac{14-12x}{3x+1}+\frac{4x+2}{2x+7}=\frac{10-9x}{x+1}+\frac{7x-5}{x+2}$$

(2) $\dfrac{2}{(x+2)^{-\frac{3}{2}}}+\dfrac{(x+2)^{\frac{1}{2}}}{2}=\dfrac{17}{4(x+2)^{\frac{1}{2}}}$

10. If a quadratic equation be satisfied by more than two different values of x it will be satisfied by all values of x; find the relation between the roots of the equations $x^2-px+q=0$ and $x^2+px+q=0$; find also the equations whose roots are the reciprocals of $ax^2+bx+c=0$

11. A rectangular court, of which the sides are a and b yards respectively, is surrounded by a path of uniform width equal in area to one mth part of the inner rectangle; find the width of the path.

No. 6.

1. Find without division the remainder when $f(x)$ is divided by x^2-a^2.

What value of y will make $ax^2+bxy+cy^2$ divisible by $x+m$?

2. Define and explain clearly a negative quantity, and from your definition show that $-a\times-b=ab$.

3. Find the continued product of

(1) $(x^2+a^2)(x^4+a^4)\ldots\ldots\ldots\ldots(x^{2^n}+a^{2^n})$.
(2) $(a-b)(a+b)(a^2+b^2)(a^4+b^4)\ldots\ldots$to $n+1$ factors.

4. The product of two factors is $(2x+3y)^3+(2y+3z)^3$ and one of them is $2x+5y+3z$; find the other.

5. Describe the process of finding the H.C.F. of two algebraical expressions, and prove that the H.C.F. of two quantities is equal to their product divided by their L.C.M. Find the H.C.F. of $2x^5-11x^2-9$ and $4x^5+11x^4+81$.

6. Find the sum of

$$\frac{x}{x^2-1}+\frac{x^2+x-1}{x^3-x^2+x-1}+\frac{x^2-x-1}{x^3+x^2+x+1}-\frac{x^3}{x^4-1}$$

and from your result infer the value of

$$\frac{a}{a^2-b^2}+\frac{a^2+ab-b^2}{a^3-a^2b+ab^2-b^3}+\frac{a^2-ab-b^2}{a^3+a^2b+ab^2+b^3}-\frac{a^3}{a^4-b^4}.$$

7. Investigate a rule for finding the square root of an algebraical quantity; and find the square root of

$$a^4+b^4+c^4+d^4+2a^2(b^2+d^2)+2b^2(c^2+d^2)+2c^2(a^2+b^2).$$

8. What value of m will make $(x-3)^2-(x-1)(x-5)=m$ an identity? Can any value of m make it an equation?

9. Solve the following equations:—

(1) $$\frac{x+2}{x+7}+\frac{2-x}{x+5}=\frac{3x+17}{x^2+12x+35}.$$

(2) $$\left\{\frac{xy}{x+y}=\frac{1}{3};\quad \frac{xz}{x+z}=1\ ;\quad \frac{yz}{2y+z}=1\right\}.$$

(3) $$\frac{1}{a+x}+\frac{1}{b+x}=\frac{1}{a-c+x}+\frac{1}{b-c+x}$$

(4) $$\left.\begin{aligned}a_1x+b_1y&=c_1.\\ a_2x+b_2y&=c_2.\end{aligned}\right\}$$ What form does the values of x and y take when

$$\frac{a_1}{a_2}=\frac{b_1}{b_2}=\frac{c_1}{c_2},$$ and what does it indicate?

10. Solve the equation $\sqrt{x^2+7x+6}-\sqrt{x^2+4x-5}=-2$, and account for the circumstance, that the values of x, determined from it, apparently do not satisfy the equation.

No. 7.

1. Distinguish *like* and *unlike* quantities and give examples. Express the aggregate of

$$a-(b-c)-\{b-(c-a)\}+\{c-(b-a)\},$$

first as a positive quantity, and secondly as a negative quantity.

2. Arrange $(x+y+z)a_1+(x+y-z)a_2+(x+z-y)a_3+(y+z-x)a_4$ in three terms involving x, y, z respectively, with coefficients consisting of a_1, a_2, a_3, a_4.

3. What is meant by the rule of signs in the multiplication of algebraical quantities? State whether you regard the rule as conventional or demonstrative, giving your reasons in the former case, or a demonstration in the latter.

4. Multiply $a+x$, $b+y$, $c+z$ together, and deduce $(x+y)^3$ from the result.

5. By what algebraic expression must x^3+y^3 be multiplied so that the product may be $x^5+x^4y+x^3y^2+x^2y^3+xy^4+y^5$?

6. Write the pth term of the quotient of $a^{mn}-b^{mn}$ when divided by a^m-b^m.

7. Divide x^3+px^2+px+1 and $x^5+px^4+qx^3+qx^2+px+1$ by $x+1$ respectively, employing any artifice to save the trouble of formal division.

8. Show that $(a+b+c)^3-(a^3+b^3+c^3)=3(a+b)(b+c)(c+a)$.

9. If $ay+bx=a$, $by-ax=b$, then $x^2+y^2=1$.

10. Resolve the following expressions into factors:

(1) $x^3-(a-b-c)x^2-(ab-bc+ca)x+abc$.
(2) $x^4+6x^3-11x^2-12x+4$.
(3) $y^3-(2a+b)y^2+(2ab+a^2)y-a^2b$.

No. 8.

1. Express in symbols the quotient arising from the product of two quantities divided by the product of their sum and difference.

2. Define the meaning of a^m, (1) when m is positive and integral; (2) when m is negative and integral; (3) when m is fractional. Explain the meaning of a^{-m}.

3. In the multiplication and division of algebraical polynomials, what preliminary steps are necessary in order to avoid confusion in performing these operations?

4. (1) Divide $21x^5 - 2x^4 - 70x^3 - 23x^2 + 33x + 27$ by $7x^2 + 4x - 9$, using Horner's method of division.

(2) $x^2+x^{-2}+1$ by $x+x^{-1}+1$.

5. Show that $ax^3 + bx^2 + cx + d$ is divisible by $x^2 + b^2$ if $ad=ac$.

6. Show that $(a+b+c)^4-(a+b)^4-(b+c)^4-(c+a)^4+a^4+b^4+c^4=12abc(a+b+c)$.

7. Investigate the rule for finding the L. C. M. of two quantities, and find the L. C. M. of $2x^2+2x^{\frac{3}{2}}-x+1$, and $x^3+x^{\frac{3}{2}}-2x+2$.

8. If $\frac{a}{b}=\frac{c}{d}=\frac{e}{f}=\cdots$ (n in number,) prove that $\frac{ace\ldots}{bdf\ldots}=\frac{a^n+c^n+\ldots.}{b^n+d^n+\ldots.}$.

9. If a, b, c be the three sides of a triangle, prove that $a^2+b^2+c^2>ab+bc+ac<2(ab+bc+ac)$.

10. Solve the equations:

(1) $\frac{x+1}{x-1}+\frac{x+2}{x-2}=2\frac{11x+18}{11x-18}$

(2) $\sqrt{x}+\sqrt{x-1}=\sqrt{x+1}$.

(3) $26\sqrt{x^4+1}=(x^2-1)\sqrt{2a^2+26^2}$.

No. 9.

1. Why are the signs + and − used to denote operations and also signs of affection? Can we interpret the meaning of such signs of affection independently of a knowledge of the specific nature of the magnitude represented by the symbols to which they are attached?

2. Add together, $4x^3+3x^2y-y^3$, $4x^2y-3x^3$, $7xy^2+9y^3-2x^2y$, and find what must be subtracted from the sum to leave the remainder $2x^3-3x^2y+y^3$.

3. (*a*) What number must be added to the expression $x^3+x^2-4(x+3)$ that it may be divisible by $x-6$ without remainder? (*b*) If the dividend be $4a^2b^2+2(3a^4-2b^4)-ab(5a^2-11b^2)$ and the quotient be $2(a+b)a+(a^2-b^2)$, what is the divisor?

4. Verify the following expressions:

(1) $8(a+b+c)^3-(a+b)^3-(b+c)^3-(c+a^3)$
$=3(2a+b+c)(a+2b+c)(a+b+2c)$.

(2) $(a+b-2c)^3+(b+c-2a)^3+(c+a-2b)^3$
$=3(a+b-2c)(b+c-2a)(a+c-2b)$.

5. Investigate the rule for finding the Highest Common Factor of two algebraic quantities, showing under what limitations factors may be introduced or suppressed at any step.

Find the H. C. F. of $x^4+p^2x^2+p^4$ and $x^4+2px^3+p^2x^2-p^4$.

Find the L. C. M. of $2\frac{1}{2}(x^2+x-20)$, $3\frac{1}{3}(x^2-x-30)$, and $4\frac{1}{6}(x^2-10x+24)$.

6. Define a fraction, and from your definition show that the value of a fraction remains unaltered by multiplying or dividing, both numerator and denominator by the same quantity.

Simplify the following :

(1) $1-\dfrac{a^2+b^2-c^2}{2ab}-\dfrac{(a+c+b)(b+c-a)}{2ab}$.

(2) $\dfrac{x^{3n}-1}{x^n-1}-\dfrac{x^{2n}-1}{x^n+1}$.

(3) $\dfrac{a^2-(b-c)^2}{(a+c)^2-b^2}+\dfrac{b^2-(c-a)^2}{(a+b)^2-c^2}+\dfrac{c^2-(a-b)^2}{(b+c)^2-a^2}$.

7. Find the square root of,

(1) $x^2+\dfrac{1}{x^2}+2\left(x-\dfrac{1}{x}\right)-1$.

(2) $\dfrac{x^2}{y^2}+\dfrac{y^2}{x^2}-\sqrt{2}\left(\dfrac{x}{y}+\dfrac{y}{x}\right)+\dfrac{5}{2}$.

8. If $x+y+z=0$; then $\dfrac{x(y^3-z^3)}{y-z}+\dfrac{y(z^3-x^3)}{z-x}+\dfrac{z(x^3-y^3)}{x-y}=0$.

9. Solve the equations,

(1) $\dfrac{x+3}{x+1}-\dfrac{x+4}{x+2}+\dfrac{x-6}{x-4}=\dfrac{x^2-2x-15}{x^2-9}$.

(2) $\dfrac{xy}{x+2y}=\dfrac{2}{5}$, $\dfrac{yz}{2y+3z}=\dfrac{6}{13}$, $\dfrac{xz}{3x+4z}=\dfrac{3}{13}$.

10. A person sets out from A, and travels towards B at the rate of $3\frac{1}{2}$ miles an hour; 40 minutes afterwards another sets out from B to meet him, travelling at the rate of $4\frac{1}{2}$ miles an hour, and he goes half a mile beyond the middle of the distance before he meets the first traveller; find the distance between A and B.

Statics and Hydrostatics.--No. 1.

1. Give definitions of the following :—(1) the "resultant" of two or more forces, (2) the "components" of a force, (3) the "tension" of a string.

2. Enunciate the parallelogram of forces, and supposing it proved as respects the direction of the resultant, complete the proof as respects the magnitude of the resultant.

3. Two forces, one of which is double the other, act upon a particle in directions making with each other an angle of 120° ; find their resultant.

4. Show how to find geometrically three forces, which, acting at a point in given directions, will be equivalent to one given pressure acting at the same point.

4. A force of 30lbs. in a direction making an angle of 60° with a horizontal line is the resultant of two forces which make angles of 45° and 120°, respectively, with the same horizontal line ; find the magnitude of these forces.

5. AB and BC are two uniform beams united by a hinge at B, and resting on walls at A and C. A weight of 100 lbs. is suspended from B, and the weight of each beam is also 100 lbs. The beam AB makes with the vertical an angle of 45°, and the beam CB an angle of 30° ; find the horizontal thrust at A and C, and the pressure on the walls.

6. Define the moment of a force about a point or an axis to which its direction is perpendicular.

State the conditions necessary and sufficient for equilibrium when forces act in one plane on a rigid body.

A uniform beam AB, whose weight is W, rests in equilibrium between a vertical wall BC and the horizontal plane AC, both smooth; CE is a string without weight, attached to a point E in the beam. If $BAC=45°$, and $ACE=30°$, find the tension of the string.

7. Define the term "centre of gravity;" and show how to find practically, the centre of gravity of an irregularly cut piece of cardboard, proving the propositions on which your method depends.

The sides of a uniformly heavy triangle are $3a$, $4a$, $5a$, respectively; find the centre of gravity of the remainder after the inscribed circle is removed.

8. A uniform straight lever is sustained on a fulcrum at the middle point, and is kept at rest by two given weights; where must they be placed in order that the distance of the one from the fulcrum may equal the distance of the other from the extremity? And where must the fulcrum be placed, if the position of the weights be reversed?

No. 2.

1. "A fluid presses equally in all directions."

Explain this statement, and show how the pressure of a fluid "at a point" is measured.

A cubical box, whose edge is one foot in length, is closed by a horizontal lid; an opening of one inch area being made in the lid, and a piston, whose weight is 1 lb., being inserted, find the least weight which must be placed on the lid to keep it down.

2. State how you would find the whole pressure which a liquid exerts on a surface immersed.

Find the pressure on a vertical rectangle 10 in. long and 6 in. broad, immersed in water, with its longer sides horizontal, and with the upper one two inches below the surface

3. State the conditions of equilibrum of a body floating in a fluid.

A cylinder, having a weight of 1 lb. on its top, floats in water with half its axis immersed vertically; on the weight being removed, it rises through one-sixth of its axis; find the weight of the cylinder.

4. Define *specific gravity*. To what unit are specific gravities generally referred, and how can the weight in pounds of a given volume of a substance be ascertained from its specific gravity?

The specific gravity of gold being 19.4, find the edge of a cube of gold which weighs one pound.

5. A ball of gutta percha, 2 in. in diameter, encloses a ball of cork 1 in. in diameter, and floats in water. Specific gravity of gutta percha is .98, of cork .24. Find what proportion of the ball will float above the surface of the water.

6. Describe the common barometer. If the tube be not exactly vertical, will the indications of the instrument be incorrect?

A water barometer has its tube inclined at 60° to the horizon, find the length of the graduations which measure variations of 1 oz. on the square inch in the atmospheric pressure, taking roughly an atmospheric pressure of 15 lbs. on the inch to be capable of sustaining a column of water 34 feet high.

How would change of temperature affect the indications of such a barometer?

7. Supposing the specific gravity of a man, of water, and of cork to be 1.12, 1, and .24 respectively, what quantity of cork must be attached to a man weighing 150 lbs. that he may just float in the water?

8. A ship sailing into a river sinks two inches, and after discharging 12000 lbs. of her cargo, rises one inch; find the weight of the ship and cargo, given specific gravity of sea water =1.026.

No. 3.

1. What is meant when a line is said to represent a force?

Represent on paper two forces of 30lbs. and 40lbs. respectively acting along lines inclined at an angle of 60°. Assuming the point of intersection and the position of one line to be given, in how many different ways may the forces act in conformity with the above directions?

2. State the principle of the triangle of forces.

A rod A B without weight can turn freely around a fixed point or hinge at one end B; it is held in a horizontal position by a force C of 50lbs. which acts vertically downwards through its middle point, and by a force P which acts at the end A. in such a manner that the angle B A P equals 30°; determine P and the pressure on the fixed point.

3. Five forces act upon a particle. Their magnitudes are represented respectively by the figures 1, 2, 3, 4, 5, their directions make the angles 60°, 120°, 180°, 240°, 300°, with a fixed line; find the magnitude of a force which will just counterbalance the tendency of the particle to move.

4. State the Principle of Moments. Prove the Principle in the case of two intersecting forces and their resultant.

5. A uniform rod has at one end a small heavy ball; the ball is pushed gently along a table with the ball foremost and falls off when a quarter of the length of the rod is beyond the edge of the table; show that the ball is as heavy as the rod.

6. Find the ratio of the Power to the Weight in the Third System of Pulleys.

In the above system the strings are fastened to the bar which supports the weight at a distance of 2 inches from each other, this being the radius of each pulley; find from what point the weight must be suspended in order that the bar may be kept horizontal, the weights of the pulleys being neglected.

7. State the Principle of Virtual Velocities and prove that it is true in the system in the preceding question. Show that this principle here expresses the fact that when a weight is raised by this system of pulleys the useful work yielded is the same as the work applied by the moving power. Is this generally the case with machines in practice? Why?

8. The upper hinge of a gate sustains only a horizontal strain, the whole weight being borne by the lower hinge. Show how the direction and magnitude of the thrust on the lower hinge may be determined; and find it in the case of a rectangular gate whose weight is 56lbs. whose centre of gravity is in the intersection of its diagonals, whose hinges are at the angles, and whose length is 8ft. height 4ft.

No. 4.

1. Define a fluid, and mention any experiments in illustration of its characteristic property.

A vertical cylinder containing water is closed by a heavy-piston, through which passes a vertical tube, communicating with the fluid at its lower end, and closed at its upper end, this tube being rigidly connected with the piston. How high will the water rise in the tube?

2. Define the terms Density and Specific Gravity.

1000 cubic centimetres of a gas whose density is 12, are mixed with 2000 cubic centimetres of a gas whose density is 16, and the volume of the mixture is diminished by one-third. Find the density of the mixture.

3. Two squares, whose sides are 9 and 5 inches respectively, are immersed vertically in a fluid, their sides being parallel to its surface. The first square has its upper side at a depth of 4 inches beneath the surface. Find the depth to which the second square must be sunk, so that the pressure on it may be 3 times that on the first.

4. If a cubical vessel be half filled with mercury and half with water, compare the pressure on the sides with the pressure on the base which is horizontal.

5. When a substance is weighed in air, in what respect does its apparent weight differ from its weight *in vacuo*?

If you were buying diamonds would it make any difference whether the day was bright and frosty or threatening to rain?

Show how to find the specific gravity of a solid by weighing it in air and in water.

6. Examine the principle by which Archimedes detected the adulteration of Hiero's crown.

The crown with an equal weight of gold and an equal weight of silver were all weighed in water. The crown was found to lose $\frac{1}{14}$, the gold $\frac{4}{77}$, and the silver $\frac{2}{21}$, of the common weight; in what proportion were the gold and silver mixed in the crown?

7. State Boyle's law of elastic fluids, and describe the method of measuring the pressure of the atmosphere.

If the barometer stands at 27.225 inches, find the atmospheric pressure per square inch.

8. Describe the barometer.

Mercury is poured into a barometer tube, so that it contains 15 cc. of air under the ordinary atmospheric pressure. The tube is then inverted in mercury, and the air then occupies a space of 25 cc., the mercury occupying a height of 302 mm. What is the pressure of the atmosphere?

9. Describe the construction and action of the common air-pump.

If there are two air-pumps with receivers, each of 10 cubic feet, and the single barrels be of 1 and 2 feet capacity respectively; compare the quantities of air exhausted by 5 turns of the first, and 3 turns of the second.

10. Describe the construction and action of the Common Pump.

In two common pumps, each consisting of one uniform cylinder, with a valve at or near the surface of the water in the reservoir, if the greatest altitude of the piston above the surface be 20ft. in each, and the least altitude of the piston be 16 feet in one, and 17 feet in the other: find in each case the greatest height to which the water can be raised, assuming that the *water-barometer* stands at 33 feet.

No. 5

1. When is a force said to be known? Show that forces may be completely represented by straight lines.

If a force which can just sustain a weight of 5lbs. be represented by a line whose length is 1 ft. 3 in., what force will be represented by a line 2 feet long?

2. Enunciate the Parallelogram of forces; and assuming it to be true for the direction, show that it is also true for the magnitude of the resultant.

Two forces, which are to each other as 2 to $\sqrt{3}$, when compounded, produced a force equivalent to half the greater; find the angle at which they are inclined to one another.

3. The centre of a boat is moored by a long rope in the midst of a stream; how can the current take the boat across the water.

4. Given the positions of the centres of gravity of a body, and of a known part of it, to find that of the remainder.

Find, the centre of gravity of a figure made up of a square and an isosceles triangle, the latter having its base

coincident with, and equal to a side of the square; the altitude of the triangle, 12 inches, is twice the side of the square.

5. What is meant by the *mechanical advantage* of a machine?

Describe the different kinds of levers, giving examples of each; and show that in one kind mechanical advantage is always gained.

How would the mechanical advantage of an oar be modified by lengthening the part of it which is within the row-lock.

6. In a system of pulleys in which each pulley hangs by a separate string, and the strings are parallel, show that P : W : : 1 : that power of 2 whose index is the number of movable pulleys.

If there are 2 movable pulleys, each of which weighs 400 lbs., and the power 300 lbs. Show that no weight can be supported by the system.

7. On an inclined plane whose angle is 45°, a power acting parallel to the plane supports twice the weight it would do if the plane were smooth, find the co-efficient of friction.

8. Two forces P and Q act at the end A and B, respectively, of a weightless straight lever A B 10 feet long; find the position of the fulcrum that equilibrium may be maintained, the inclinations of P's and Q's directions being 60° and 30° respectively.

9. A uniform rod whose weight is W, rests with its lower end, A, upon a smooth horizontal plane, and its upper end B on a slope inclined at an angle of 60° to the horizon; find the inclination of the rod to the horizon in order that the pressure exerted by it on the slope may be equal to half its own weight.

No. 6.

1. State the experimental laws on which the Science of Statics is based. Enunciate the Parallelogram of Forces and state the principles that are assumed in the demonstration of it.

2. Two equal forces act at a certain angle on a particle and have a certain resultant; also if the direction of one of the forces be reversed, and its magnitude be doubled, the resultant is of the same magnitude as before; show that the two forces are inclined at an angle of 60°.

3. Find the conditions of equilibrium when any number of forces act on a particle in one plane.

Three forces represented by 40 lbs., 60 lbs., 80 lbs., act in a vertical plane upon a particle, and their respective directions make angles of 30°, 60°, 120° with the horizon; find the magnitude of a fourth force that shall counterbalance their effect upon the particle.

4. When three forces acting in one plane on a rigid body produce equilibrium, the algebraical sum of the moments of either pair about any point in the line of action of the third is zero.

A circular plate of metal weighing 10 lbs., supported by a hook at the point A in its circumference has a weight of 50 lbs. suspended from the point B, diametrically opposite to A; with what force must the point D, at the upper extremity of the diameter DE at right angles to AB, be pressed vertically upwards, that the diameter AB shall incline downwards at an angle of 30° to the horizon?

5. Define the centre of parallel forces. What particular case of it constitutes the Centre of Gravity?

A beam weighing 140 lbs., and ten feet in length rests on two points four feet from each end; find the greatest weight which is unable to overturn it, on whatever point of the beam it is placed.

6. A rod 11 inches long has a weight of 7 ounces at one end, and a weight of 8 ounces at the other end, and is found to be in equilibrium when balanced on a fulcrum 5 inches from the heavier weight. If the weights are interchanged the fulcrum must be shifted $\frac{1}{17}$ of an inch; find the weight of the rod, and the position of its centre of gravity.

7. If W_1 and W_2 be the apparent weights of a body when placed successively at the two ends of a balance, what is its true weight, (1) when the arms are unequal; (2) when one of the scales is loaded?

If one of the arms of a balance is twice as long as the other, and a weight of one pound is put in the scale attached to the shorter arm, will a customer gain or lose by buying two pounds, weighing one pound in each scale?

8. A weight is placed upon a horizontal table which has three legs A, B and C; the portion of the weight supported by A is 8 lbs., that by B is 5 lbs., and that by C is 9 lbs. Find the weight and its position upon the table, the distance between the legs being 2 feet, 4 feet and 5 feet respectively?

9. Find the ratio of the power to the weight in the screw. Five turns of a screw working in a fixed collar have the effect of raising the end of the screw one inch; what would be the effective force at the end of the screw in the direction of its axis if a force of 10 lbs. were applied at the extremity of a lever 5 feet long working in the head of the screw?

10. A beam is to be placed against a vertical wall, and it is required that its inclination to the horizontal floor on which its lower end rests shall not be greater than 30°; find the position of its centre of gravity, so that it may not slip at that angle when its coefficient of friction at each end is .5. And show that although a beam may be made to stand at an inclination to the horizon when the floor is rough and the wall smooth, it cannot be made to stand at any but a vertical position when the floor is smooth and the wall rough.

No. 7.

1. Explain the experimental process by which the equal transmission of fluid pressure in all directions is proved; and define the meaning of the term "pressure at a point."

2. State and explain the Hydrostatic Paradox. Describe Bramah's Press. The diameters of the piston being one and five, and the advantage of the lever ten, what power would produce a pressure of two tons?

3. Give the rule for finding the whole pressure of a fluid on a surface exposed to it.

Compare the pressures upon the three upper and three lower faces of a cube suspended by one of its angles in a homogeneous fluid at a depth equal to the side of the cube.

4. Define *specific gravity*, and show how to find the specific gravity of, (1) a solid lighter than water; (2) of a fluid.

A piece of wood weighs 7 lbs. and a piece of iron weighs 7·8 lbs. in air, and 6·7 lbs. in water; the wood and iron together weigh 5·3 lbs. in water; what is the specific gravity of the wood?

5. A watch chain which weighs 200 grs. in air, weighs only 184·7 grs. in water; find the ratio of the volumes of brass and gold in it, the specific gravity of brass being 7.8, and of gold 19·3.

6. Describe Nicholson's Hydrometer, and compare by means of it the specific gravities (1) of a solid and a fluid, (2) of two fluids.

A Nicholson's hydrometer is used as follows:—51·72 grams is placed on the upper cup, a fragment of metal is placed on the cup, and it is found necessary to take off 14·85 grams to make the instrument float at the same level; the metal is then placed in the lower cup, and 2·03 grams added above to restore the former level; find the specific gravity of the metal.

7. Enunciate Boyle's law connecting the volume and tension of a given weight of air.

If the height of a barometer changes from 755 mm. to 770 mm., what is the change in the weight of a litre of air at O°C. ? (The weight of a litre of air at O°C and under a pressure of 760 mm. of mercury is 1·293 grams).

8. Describe the construction and action of a Smeaton's single-barreled air-pump.

A piece of cork is floating in a basin of water, and the basin is placed under the receiver of an air-pump. State and explain the effect of pumping out a portion of air in the receiver.

9. Describe the construction and explain the action of the Forcing Pump.

In a forcing pump the area of the piston is 3·5 square inches and a power of 77 pounds is employed in forcing the piston down ; find the pressure of air within the air chamber.

10. A bubble of gas, whose volume is 2 cubic inches, begins to rise from the bottom of Lake Ontario ; what will be its volume when it bursts at the surface, the depth of the lake being 600 feet, and the pressure of the atmosphere 15 lbs. on the square inch ?

No. 8.

To Triangle of Forces inclusive

1. Explain clearly what you understand by the *weight* of a body.

A cubic inch of lead is suspended by a spiral spring, and the consequent elongation of the spring is observed. If the experiment were repeated at the Equator, would the elongation be the same or different ? Give your reasons.

2. Define *Force*, and explain clearly the method of estimating and comparing statical forces.

Show that forces may be properly represented by straight

lines; and enumerate the chief forces with which we have to deal in *Statics*.

Is the "*direction* of the *Force*" and the "*line of action* of the *Force*" the same thing?

3. Enunciate the *Parallelogram of Forces*, and assuming it to be true so far as the *magnitude* of the *Resultant* is concerned, complete the proof.

State clearly what assumptions are made in proving the Parallelogram of Forces. Show how it may be proved experimentally.

4. Three equal forces act in one plane in such a way that each of them makes an angle of 120 degrees with each of the other two; show that the three forces will balance.

Employ the preceding proposition to show that the resultant of the forces, 7 lbs. and 14 lbs., acting at an angle of 120 degrees is the same as the resultant of the forces 7 lbs. and 7 lbs. acting at an angle of 60 degrees.

5. Six vertical smooth posts are fixed in the ground, at equal intervals, round the circumference of a circle, and a cord, without weight, is passed twice round them all in a horizontal plane, and pulled together with a force of 100 lbs.; find the magnitude and direction of the resultant pressure on each post.

6. Two forces acting in opposite directions to one another on a particle have a resultant of 28 lbs., and if they acted at right angles they would have a resultant of 52 lbs.; find the forces.

7. Enunciate and prove the Triangle of Forces. How can three sides of a triangle, not passing through a point, represent three forces which act at a point?

Three forces, represented in magnitude and direction by the sides of a triangle, act on a point; if the greatest of the forces be to the least as 5 to 3, and the triangle be right angled, to find the ratio of the other forces.

8 If three forces, the magnitudes of which are $3P$, $4P$, and $5P$, act at one point and are in equilibrium, show that the forces $3P$ and $4P$ are at right angles to each other.

9. A rod, AB, without weight, can turn freely round a fixed point or hinge B; it is held in a horizontal position by a force Q of 50 lbs., which acts vertically downwards through its middle point, and by a force P which acts at the end A in such a manner that the angle BAP equals 30°; determine P and the pressure on the fixed point.

10. A beam, capable of moving about one end, is kept in a position inclined to the horizon at an angle of 60° by a string attached to the other end. The string is inclined to the horizon at an angle of 60° in an opposite direction; compare the tension of the string with the weight of the beam.

No. 9.

1. Explain the meaning of the statement, "Three forces represented in magnitude and direction by the sides of a triangle, taken in order, will keep a particle at rest." Show how this proposition is derived from the parallelogram of forces.

2. A weight of 8 cwt. suspended by a rope from the top floor of a warehouse, on one side of a street 50 feet wide, is required to be drawn across by a rope from a floor at the same height on the other side of the street, attached to a point in the first rope 35 feet below the point of suspension, what will be the tension of the ropes when the weight is vertically over the centre of the street?

3. Explain the meaning of the term Resolution of Forces. Show how to resolve a given force into two others at right angles to each other, and one of which shall be half the original force.

4. A peg or tack A has four cords attached to it, at the end of which four men pull, each with a force of 100 lbs., and in directions which are all in the same vertical plane, and make equal angles of 30° with one another. Find the magnitude and direction of the strain upon A when a gun weighing 18 cwt. is hung upon it, and when the angles which the outer cords make with the horizon are equal.

5. (α) If the angle between the directions of two forces be increased, their resultant will be diminished. And (β) if three forces in a plane acting upon a point be proportional to the sides of a triangle constructed upon their directions taken in order, each of them will be equal and opposite to the resultant of the other two. But (γ) if an angle of this triangle be increased, the opposite side will be increased, and, therefore, the resultant will be *increased*. Demonstrate the statement (α) and (β), and reconcile the apparant anomaly involved in them as indicated in (γ).

6. What conditions must be satisfied in order that forces acting on a bar which is free to turn about a fixed axis may not produce motion about that axis.

7. A uniform lever, whose weight is 8 lbs. and length 3 feet, has a weight of 20 lbs. suspended from one end and 14 lbs. from the other. Find the position of the fulcrum when there is equilibrium.

8. A piece of timber, 25 feet long, balances upon an edge at a distance of 10 feet from one end, and, when the edge is shifted to 12 feet, it requires 56 lbs. to be placed upon the other end to make it balance. What is the weight of the piece of timber?

No. 10.

1. Define the terms, "force," "equilibrium," the "resultant" of two or more forces; the "components" of a force.

2. What force must a man exert in a horizontal direction to draw a weight of 3 cwt. four feet out of the perpendicular, supposing it suspended from a point twenty feet above that at which he applies his strength?

3. A parallelogram $ABCD$ is acted upon by forces in the directions and proportional to AB, BD, and DC; find the direction and proportional magnitude of a fourth force which will produce equilibrium.

4. Show how to find the resultant of any number of forces acting at a given point and making known angles with a given straight line.

Four forces of 5lbs., 6lbs., 8lbs., and 11lbs., make angles of 30°, 120°, 225°, and 300°, respectively, with a fixed straight line; find the magnitude and direction of their resultant with reference to that line.

5. Three forces 5, 6, and 7, all in the same plane and making equal angles with one another, act upon a point; what force, acting in the same plane, will keep the point at rest, and what angle must it make with the force 6?

6. A rope runs through a ring to which is suspended a weight of 1 cwt. and two men pull at the ends of the rope; find its tension, supposing the hands of each man to be 3 ft. above the ring, and the length of the rope to be 12 feet.

7. Define the moment of a force with respect to a given point. What is the physical notion involved in the idea of a moment? Show how a moment may be represented geometrically.

Prove that if two forces meet in a point their moments with respect to any point situated on their resultant are equal and opposite.

8. A uniform rod 3 ft. long and weighing 6 ounces is held horizontally in the hand, being supported by means of a finger below the rod two inches from the end, and the thumb over the rod at the end; find the pressures exerted by the finger and thumb respectively.

9. A uniform plank 20 feet long and weighing 42 lbs. is placed over a rail; two boys, weighing respectively 75 lbs. and 99 lbs. stand on the plank each one foot from the end; find the position of the rail for equilibrium.

If the two boys change places, find where a third boy weighing 72lbs. must stand so as to maintain equilibrium without shifting the plank on the rail.

10. Define "the centre of parallel forces" and show that in case of two such forces acting upon a rigid body, their "centre" divides the straight line which joins their points of application in the inverse ratio of the forces.

11. Find the centre of gravity of the figure formed by describing an equilateral triangle upon one of the sides of a square.

Chemistry—No. 1.

1. Define the following terms, giving examples :—Atom, molecule, atomic weight, molecular weight.

2. Distinguish between a *chemical compound* and a *mechanical mixture*. Why is the atmospheric air declared to be a mixture and not a compound?

3. What is meant by the atomicity of an element? Give the atomicity of as many of the non-metallic elements as you can.

4. How would you demonstrate, experimentally, the composition of water and air?

5. I have four vessels containing, respectively, nitrogen, hydrogen, nitrogen dioxide, and marsh gas; give a precise account of the nature of any result observed upon mixing oxygen with each of these gases, and of the results produced on introducing a lighted taper into the several mixtures.

6. What is the cause of flame? Describe the construction of the flame of a candle, or of a spirit lamp, explaining why the former is luminous and the latter not; and state what means you would resort to for increasing the luminosity of a flame.

7. By heating coal in a retort, a mixture of the following gases is obtained :—Olefiant gas, light carburetted hydrogen, carbon monoxide, carbon dioxide, sulphuretted hydrogen, and ammonia; give the composition, and a brief statement of the properties by which each of these gases is distinguished.

8. What is a crith, and how is it employed by chemists?

9. From the percentage analysis of a compound how could you determine its formula?

A body yields by analysis, 43·75 per cent. of nitrogen, 6·25 per cent. of hydrogen, and 50 per cent. of oxygen; what is its formula and name?

Chemistry.—No. 2.

1. Define the terms *acid*, *base*, and *salt*.

2. If I allow a current of steam to blow through some iron nails, heated to redness in a crucible, what happens? If I substitute copper nails for iron ones, in the above experiment, how will this affect the result?

3. You have given you zinc, sulphuric acid, caustic potash, and water, and are required to prepare hydrogen from these materials by two distinct processes; how would you proceed? and show by an equation the chemical changes in each case.

4. You have some mercury in a glass flask and a piece of hard glass tubing and are required to make pure oxygen gas; how will you do it?

5. Give the composition of natural waters used for domestic purposes. What is meant by the term "hardness" as applied to water, and what is the difference between "temporary" and "permanent" hardness?

6. Describe the character of nitrogen, the mode of distinguishing it from carbonic dioxide, and the process for obtaining it.

7. Describe the character of nitric acid, and the process for preparing it, with distinguishing tests.

What is the theoretical quantity of pure nitric acid obtainable from one ton of sodium nitrate?

8. How would you prepare chlorine, and how would you show that a jet of hydrogen burns in chlorine? Give a sketch of all the apparatus you would employ.

9. In dissolving zinc in hydrochloric acid, and collecting the hydrogen evolved, 250 cubic centimetres of the gas measured at 0° C., and 760 mm. pressure, were obtained. How much zinc was dissolved?

10. What do you mean by *absolute*, *latent*, and *active affinity*? Illustrate your meaning by examples.

No. 3.

1. Water is said to be a compound of Oxygen and Hydrogen. How would you prove this experimentally? What are the characteristics of a chemical compound? What is an Element?

How many cubic centimetres of Oxygen and Hydrogen at 0°c. and 760 mm. pressure can be obtained by the decomposition of 1 gram of water?

2. How would you prepare Oxygen from Manganese Dioxide (2) from Maganese Dioxide and Sulphuric Acid? Express the reactions by equations. When Manganese Dioxide is added to Potassium Chlorate the Oxygen is given off at a much lower temperature. Give the most probably explanation of the action of Manganese Dioxide in this case.

3. How would you prove experimentally that Carbon Dioxide is a constituent of the atmosphere? What purpose does it serve in the atmosphere?

4. How would you prepare Nitrous Oxide? In what respect does it resemble Oxygen, and in what respect does it differ from it?

5. How would you prepare Ammonia Gas? Explain clearly how you would find the density of Ammonia. What happens when Ammonia Gas and Hydrochloric Acid Gas are mixed together? Illustrate the reaction by an equation.

6. What is meant by the Halogens? Explain the formation of Chlorine (1) from a mixture of Manganese Dioxide and Hydrochloric Acid. (2) from Common Salt, Manganese Dioxide and Sulphuric Acid. Illustrate by equations in each case. What happens when a mixture of one volume of Chlorine and two volumes of Hydrogen is exposed to the sun's light. How will water act on the product of the reaction?

7. I want 10 litres of Chlorine. How much salt, manganese containing 70% of the dioxide, and sulphuric acid containing 50% of real acid, will be needed?

8. Explain by equations (1) the action of Copper on Sulphuric Acid. Sulphuric Acid and Zinc give Hydrogen, why does not Nitric Acid and Zinc give the same element?

9. Describe the preparation and properties of Sulphuric Acid, expressing the re-actions by equations. What is the action of Sulphuric Acid on sugar? What on wood? Why is Sulphuric Acid called a di-basic acid?

10. Explain fully the process by means of which Phosphorus is extracted from bones. How does Phosphorus act on a solution of Cupric Sulphate?

No. 4.

1. What is the action of water on each of the following substances? Represent the action by equations where you can :—

Hydrogen, Carbon dioxide, Ammonia, Calcium carbonate, Nitrogen trioxide, Sodium, Potassium.

2. What are the resulting products when Carbon, Sulphur, Phosphorus, and Sodium are burned in Oxygen? Express the reaching by equations.

3. Describe two experiments to show the difference between a *mechanical mixture* and a *chemical compound*?

4. What compounds can be formed from the following elements: Oxygen, Hydrogen, Chlorine? and how would you form them?

5. What elements can be obtained from Hydrochloric Acid, Ammonia, and Water? State how you would obtain them in each case.

6. An electric spark is passed through a mixture containing 120 cc. of Hydrogen, and 60 cc. of Oxygen. How would you arrange the experiment to show the gaseous condensation?

7. When Nitric Acid is poured upon copper, what takes place? Represent the reaction by an equation.

8. You have some Ammonium Carbonate, and Nitric Acid, and are required to make and collect laughing gas from these materials; how would you do it? Describe the apparatus you would employ, and give a sketch of it. What are the chief properties of laughing gas, how does it resemble Oxygen and how distinguished from it? 9. You have given you some Sulphur, Water, and Nitric Acid, describe how you would make Sulphuric Acid from these materials. How would you recognize the Sulphuric Acid when you had made it?

10. You have a mixture of chalk and charcoal, and wish to separate the charcoal from the chalk, how will you do it?

11. Describe some experiments to show the different "modes of chemical action."

12. 40 cc. at the normal pressure and temperature, of a gas containing Oxygen and nitrogen, were mixed with 37cc. of Hydrogen and exploded; 32cc. of gas remained. What was the composition of the original gas?

No. 5.

1. State the general character of acids. What is meant by the "acid reaction?" What is an alkali? What is meant by the alkaline reaction?

2. State the physical chemical characters of Oxygen. How does it occur in nature? How can it be obtained pure? In what way do plants produce free Oxygen?

3. Explain the terms "Oxidation" and "Reduction," and give examples.

4. What is Combustion? What function does Oxygen perform in Combustion? What is the relation of Oxygen to the process of respiration in air-breathing and in water-breathing animals?

5. State the physical characters of Nitrogen? How can it be obtained pure? What is the function of Nitrogen in the atmosphere?

6. How does Chlorine occur in nature? How is Chlorine gas prepared? Give the physical and chemical characters of Chlorine. Explain the bleaching action of Chlorine Water.

7. How is Hydrochloric Acid prepared? The specific gravity of a solution of hydrochloric acid in water containing 40.8 per cent. of hydrochloric acid is 1.2; how much common salt must be taken in order to prepare a litre of such solution?

8. You have given to you a piece of charcoal weighing 5 grams, and 6 litres of oxygen. How much Carbon Dioxide by volume and by weight can you obtain by the combustion of the Carbon in Oxygen, and how much if any, will be left?

9. How does Sulphur occur in nature? How is it obtained pure? State the action of heat upon it. Give the formula, the character, the percentage composition, and the modes of preparation of the two most important acids of sulphur.

10. How much dilute Sulphuric Acid (density = 1.3) must be taken to neutralise 50 c. c. of a solution of Ammonia of which the density is .9?

No. 6.

Elementary Principles and Oxygen.

1. Explain the terms Chemical Combination and Chemical Decomposition, and give examples of each.

2. What is the difference between *elements* and *compounds*? How would you endeavour to ascertain whether a certain substance is an element or a compound?

3. *Chemical combination* is said to take place in certain definite proportions. Explain this and give examples.

4. What happens when a glass rod, moistened with sulphuric acid, is brought very near to a small heap of mixture of sugar and potassium chlorate, but so as not to touch the heap? What characteristic of chemical affinity is illustrated by this experiment?

5. Enunciate "Avogadro's Law," and state briefly the evidences in its favour. Deduce from it a rule for finding the atomic weight of an elementary gas, and also the density of a compound gas.

6. Define a "molecule" and an "atom," illustrating the difference in the meaning of these terms.

7. Express by equations the reactions which occur when (*a*) potassium chlorate, (*b*) mercuric oxide, (*c*) manganese dioxide, are strongly heated.

8. What are the most important properties of oxygen? How is it distinguished from other gases? How did Pictet obtain it in the liquid state?

9. The following bodies are separately burned in oxygen (*a*) hydrogen; (*b*) sulphur; (*c*) charcoal; (*d*) iron; (*e*) phosphorus; (*f*) magnesium. Give the name of the oxide formed in each case, and express all the reactions by equations.

10. At the bottom of a glass flask some sand is placed, and on the top of it a fragment of phosphorus. The flask is then filled with dry oxygen and closed air-tight, and the whole weighed. The flask is then warmed until the phosphorus kindles, and when quite cold re-weighed. The stopper is removed for an instant and a third weighing made. How will the three weighings differ?

No. 7.

1. Matter is said to be indestructible. Explain this statement, and describe an experiment in support of it.

2. Each element has a certain symbol, combining weight and density. Explain these terms.

3. How is hydrogen usually prepared, and what impurities may it contain when prepared by this method?

4. What occurs when zinc is heated with a strong solution of caustic potash or soda? Give an equation.

6. Equal weights of potassium, lithium, sodium, are placed in contact with water, and the hydrogen produced by each reaction is collected separately. Which metal will yield the greatest volume, and why?

6. Why is manganese dioxide generally mixed with potassium chlorate for the preparation of oxygen? Explain its action.

7. Sulphur is burnt in a jar of air, and also in a jar of oxygen. Name the gases present in each jar after the combustion, and state the action of water on each.

8. Of what is water composed? Who discovered its composition? How and when was the discovery made? Give all the ways you know for obtaining (*a*) hydrogen and (*b*) oxygen from water.

9. Classify the various kinds of impurities found in natural waters. Which impurities may be removed by filtration? What do you understand by the terms "hard" and "soft," as applied to water? How may the degrees of hardness of a water be ascertained?

10. Who first determined the composition of the air? Describe fully the method employed. Name the bodies which are *always* present in the air in small quantities, and those which are *occasionally* present. Describe a method for recognising with certainty each constituent of the atmosphere.

11. Is air a mechanical mixture or a chemical compound? Give reasons in support of your answer.

12. How is nitric acid usually prepared (*a*) on the small scale, (*b*) on the large scale? What impurities are generally present in the commercial acid?

No. 8.

1. Name the elements contained in an ordinary candle, and explain fully the chemical changes which occur when it burns in air.

2. State briefly the laws enunciated by Dalton and by Gay Lussac on the subject of chemical combination.

One hundred grams of iron filings are heated with the same weight of sulphur till combination takes place. Which element would be found in excess after the reaction, and how much of it?

3. Name four oxides which when simply heated lose oxygen. Express each reaction by an equation.

4. Name any four metals which if dropped into hydrochloric or sulphuric acids decompose these acids with evolution of hydrogen. Give equations.

5. What changes are produced in air by the breathing of animals, and during the growth of plants?

A candle is burned in a closed bottle of air till it goes out, and a mouse is kept in a closed bottle of air till it dies. Why does the candle go out and the mouse die?

6. How is the remarkable uniformity in the composition of the air explained?

7. What happens when hydrogen is passed over heated copper oxide? Express the reaction by an equation. Explain how the action of hydrogen on copper oxide may be used as a means of determining the composition of water.

8. How does nitrogen occur in nature? Mention some gaseous and solid bodies which contain it. Give a full account of any experiment which proves the existence of nitrogen in air.

9. Give a short account of the history and natural occurrence of ammonia. How may ammonia be prepared (*a*) by synthesis, (*b*) from nitric acid, (*c*) from ammoniumsalts?

10. How does carbon occur in nature, (*a*) free, (*b*) combined? How are the three allotropic forms of carbon proved to consist of the same substance?

11. What volume of carbon dioxide measured at 745 mm. and 15°*C.* can be obtained from 150 grams of marble containing 3 per cent. of silica.

Euclid.—No. 1.

Book I.; 1–16.

1. (*a*) Define the terms: circle, plane, superficies, postulate, and axiom.

(*b*) Write out Euclid's three postulates.

2. Show that the following are incorrect:

(*a*) "If unequals be added to unequals the wholes are unequal."

(*b*) "Parallel straight lines are such as do not meet however far they may be produced."

3. Distinguish between problem and theorem, and between hypotheses and data.

4. (*a*) The angles at the base of an isosceles triangle are equal.

(*b*) What is a corollary?

(*c*) When is one proposition the converse of another?

(*d*) What is the converse of the above proposition?

5. If two triangles have the three sides of the one equal to the three sides of the other, each to each, the triangles must be equal in all respects.

6. (*a*) To bisect a given rectilineal angle.

(*b*) Why is the equilateral triangle which is employed in the construction to be described with its vertex remote from the given angle?

7. (*a*) To draw a straight line at right angles to a given finite straight line from a given point in the same.

(*b*) Distinguish between drawing a line at right angles to another and drawing it perpendicular to it.

(*c*) If the given point is at the end of the given line how do you proceed?

8. (*a*) If at a point in a straight line, two other straight lines, upon the opposite sides of it, make the adjacent angles together equal to two right angles, then these two straight lines shall be in one and the same straight line.

(*b*) What is meant by an indirect demonstration?

(*c*) Why are the words "upon the opposite sides of it" necessary?

9. (*a*) If one side of a triangle be produced, the exterior angle is greater than either of the interior opposite angles.

(*b*) Write out the enunciations of the various propositions employed in constructing and demonstrating this theorem.

10. If two isosceles triangles are on the same base, the straight line joining their vertices, or that straight line produced, will bisect the base at right angles.

Book-Keeping.--No. 1.

1. If a series of connected business transactions be classified under the heads of Capital, Merchandise, A. B., Cash, Interest, C. D., Bills Payable, E. F., Rent, Bills Receivable and Expense ; from which of them do we ascertain the Financial Position of the business at any time by a comparison of the assets and liabilities at that time ; and from which do we ascertain the same thing from the original capital and the subsequent gains and losses ?

2. What item of information is that which must be considered in both of the above processes ? and explain why.

3. If we sell goods to A. B. on account, in which Ledger accounts are entries made ? Explain the *object* of each entry, showing that each is made for an *entirely different* purpose.

4. Give answers to the following, similar to those required in the preceding question.

(*a*) Bought goods from C.D., giving in payment my cheque on Ontario Bank.

(*b*) Sold goods to E.F., receiving in payment his cheque on Imperial Bank.

(*c*) Got M.N's note discounted at Ontario Bank. Face of note $500. Proceeds $490, passed to my credit.

5. Give Day Book entry for each of the following Ledger postings in Merchandise Acct.

DR. MERCHANDISE. CR.

1881			1881		
Jan. 1	Capital	1200	Jan. 19	Cash	300
" 15	A. Bond	500	Feb. 8	Bills Rec.	150
" 31	Cash	100	" 17	C Dunn	200
Feb. 7	Bills Rec.	400	" 26	Bills Pay.	600
" 15	Bills Pay.	300			
" 28	Bank	200			

6. The following is the Trial Balance of my Ledger taken March 15, 1881, giving the results of my transactions from Jan. 1, to March 15. Arrange these results under the heads of Capital, Loss and Gain, and Balance, in the same way they would be done in closing the accounts, thus showing my Financial Position on the 15th March, by the two processes mentioned in No. 1:

Jan. 1st, 1881.	$ 250	Capital	$ 1350
	3590	Cash	3190
	873	A. Bond	473
	54	Interest	74
From	952	Bills Receivable	652
January 1st.	146	E. Ford	946
to	4825	Mdse.	4025
March 15.	263	Bills Payable	863
	100	Rent	
	729	C. Dunn	229
	40	Expense	
	$11802		$11802

Goods on hand March 15th $1300.

No. 2.

1. Explain, and illustrate by an example, the difference between pure, single Entry, and Double Entry.

2. What does the word "Balance" mean as used in connection with closing entries? Explain with special reference to the entry on Cr. side of merchandise account of the goods unsold.

3. In which of the following accounts will the first entry be made necessarily on the Dr. side; in which on the Cr. side; and in which may it be on either side:—Merchandise, Interest, Bills Payable, Cash, Commission, Bills Receivable, John Smith, and Expense? Give reason in each case.

4. Give an example of four Notes, each at two months,

and each having a different date, but all payable on the same day.

5. In what respect do the Capital and Balance accounts agree, and in what respect do they differ?—in other words, what information is furnished alike by both, and what information does the Capital account give which the Balance account does not give; and *vice versa*?

6. A owes B $100 and B owes C $100. C agrees to settle with B by taking B's draft in his favor upon A for the amount, which A accepts. Give the journal entry each makes.

7. The following five entries contain the history of a note. Journalize them.

1881 March 1. Sold goods to Charles Adin, $800

March 3. Rec'd from him his note at 3 months, dated March 1st for the amount.

March 4. C. Adin's note discounted at Ontario Bank, proceeds $785.89 passed to our credit.

June 6. C. Adin's note protested for non-payment. Protest charges $1.10. Paid the amount $801.10 by cheque.

27. Received Cash from C. Adin in payment of his Note and charges $801.10 and also interest for 21 days at 7%.

8. Journalize also the following:

June 4. Received from H. Salmon, Hamilton, 3 cases, 60 pieces Tweed, 1950 yards, at $1.20, $2340. Paid freight and drayage $10.

7. Sold James Taylor 2 cases of above, 40 pieces, 1300 yards, at $1.50 on his note at 2 months.

11. Sold Remaining Case, 20 pieces, 650 yards, to Benj. Worth, at $1.50 on his note at 3 months.

13. Rendered Account Sales to H. Salmon. My Commission $58.50. Net Proceeds passed to his credit, $2,856.50.

English Literature.--No. 1.

1. "Each canto of the 'Lady of the Lake' is introduced by one or more stanzas in the Spenserian metre."

Describe the Spenserian stanza.
Who are the chief writers using this metre?
What is the prevailing verse in this poem?

2. Sketch the course of events which led to the meeting between Fitz-James and Roderick at Coilantogle Ford.

3. "No poet ever equalled Scott in the description of wild and simple scenes and the expression of wild and simple feelings."—*Hutton.*

Quote any passages which would illustrate the truth of these lines.

4. Sketch the life of Scott, introducing dates where you can.

5. Draw an outline map of the part of Perthshire in which the scenes described took place. Show the position of the following:—Trossachs, Lochs Katrine, Achray and Vennacher, Coilantogle Ford, Ben Venue, Ben Ledi, River Teith, Stirling.

6. "Fleet foot on the Correi.
Sage counsel in cumber,
Red hand in the foray,
How sound is thy slumber."

(*a*) Explain the meaning of Correi, cumber and foray.
(*b*) Scan these lines—name the metre.

7. "Scott and Byron afford striking examples of the two kinds of description. These two men of genius belonged to the same school of literature, and wrote on kindred themes; but Scott is objective, Byron subjective."

Explain the terms "objective" and "subjective" as applied to poets, giving as many examples of each as you can.

8. Name the figures in the following lines:—

"A howling wilderness."
"Can gray hairs make folly venerable?"
"Many men of many minds."
"Thy rod and thy staff they comfort me."

No. 2.

1. "The force in the 'Lay,' is thrown on style; in 'Marmion,' on description; and in the 'Lady of the Lake,' on incident."

(*a*) What is meant by style?

(*b*) Refer to incidents which would illustrate the last statement, quoting the passages when you can.

2. What use does Scott make of the Spenserian stanzas with which he begins each Canto?

3. Define alliteration, rhyme, and middle rhyme. Show the use Scott makes of alliteration and middle rhyme in the "Lady of the Lake."

4. Name the most important writers contemporary with Scott, and what are their chief works?

5. Define the following figures; give examples of their use in the "Lady of the Lake":—

Metonymy, epizeuxis, simile, aposiopesis, antonomasia.

6. The Chief, in silence strode before,
And reached that torrent's sounding shore,
Which, daughter of three mighty lakes,
From Vennachar in silver breaks,

Sweeps through the plain, and ceaseless mines
On Bochastle the mouldering lines,
Where Rome, the Empress of the world
Of yore her eagle wings unfurled ;
And here his course the Chieftain staid
Threw down his target and his plaid,
And to the Lowland warrior said :—
Bold Saxon ! to his promise just,
Vich-Alpine has discharged his trust.

Stanza xii., Canto V.

(*a*) Point out the figures of syntax and of rhetoric in this passage.

(*b*) "Three mighty lakes." Name them.

(*c*) "The mouldering lines." Explain the reference.

(*d*) Scan line 6.

7. Brian an augury hath tried,
Of that dread kind which must not be
Unless in dread extremity,
The Taghairm called.

(*a*) Explain fully this augury.

(*b*) Give the derivation of "augury" and "Taghairm."

No. 3.

1. Who is the hero of the Lady of the Lake? Give reasons for your answer.

2. Explain the following taken from Canto VI :—

(*a*) Rousing each *caitiff* to his task of care.—*St. 1.*
(*b*) Kind nurse of men.—*St. 1.*
(*c*) Court of Guard.—*St. 2.*
(*d*) Their *harness* rung—*St. 2.*
(*e*) The Italian's *clouded* face.—*St. 3.*
(*f*) The Fleming.—*St. 3,*
(*g*) Thou now hast glee-maiden and harp.—*St. 6.*
(*h*) Like errant damosel of yore.—*St. 9.*
(*i*) Their guerdon took.—*St. 10.*
(*j*) Antique garniture decked the sad walls.—*St. 12.*

3. "But Ellen boldly stepped between,
And dropped at once the tartan screen;
So, from his morning cloud, appears
The sun of May, through summer tears.
The savage soldiery, amazed,
As on descended angel gazed;
Even hardy Brent, abashed and tamed,
Stood half admiring, half ashamed."—*St. 7.*
"As the tall ship, whose lofty prore
Shall never stem the billows more,
Deserted by her gallant band,
Amid the breakers lies astrand—
So, on his couch, lay Roderick Dhu!"—*St. 13.*
"Thy stately pine is yet unbent,
Though many a goodly bough is rent."—*St. 13.*

(*a*) Point out the figures of syntax and of rhetoric in these passages.
(*b*) Give the etymology of savage, soldiery, astrand, descended, angel, never, couch, and stately.
(*c*) Who utters the last passage?

4. Give a description of the Battle of Beal'an Duine, quoting where you can.

5. Sketch the life of Addison. Mention his more important literary works.

6. Mention other periodicals similar to *The Spectator* published during the eighteenth century. Who conducted these periodicals?

No. 4.

1. Distinguish clearly between poetry and prose; and explain the nature of the following metres:—*Iambic tetrameter*, *Anapæstic dimeter*, and *Dactylic trimeter*.

2. What historical person does Scott attend to portray in ames Fitz-James?

3. Write explanatory notes on the following:—*Trosachs*, *Tinchel*, *Bonnet-pieces*, *James of Bothwell*, and *Snowdoun*.

4. Give the meaning of *bourgeon*, *sooth*, *braken*, *matins*, *erne*, *broom*, *glaive*, *battalia*, *placket*, and *talisman*.

5. Explain the italicized words in the following:—

(*a*) I *guess* his *cognizance* afar.—*Canto V. St. 31.*

(*b*) Which else in *Doune* had peaceful hung.
—*Canto V., St. 5.*

(*c*) The young king, *mewed* in Stirling tower.
—*Canto V., St. 6.*

(*d*) Ask we for flocks these *shingles* dry.—*Canto V. St. 7*

(*e*) Long live the *Commons' King*, King James.
—*Canto V., St. 21.*

(*f*) And many a hideous engine grim,
For wrenching joint, and crushing limb,
By *artist* formed.—*Canto VI. St 12.*

(*g*) Where played with many-colored gleams,
Through *storied pane* the rising beams.

—*Canto VI., St. 23.*

6. Sketch the character of Will Wimble; give a short account of how he spent his time; and give a summary of that number of the Spectator which treats of "Party Divisions."

7. Give the etymology and the meaning of the italicized words:

(*a*) I intend to form several of my *ensuing speculations.*

(*b*) A *sociable* temper.

(*c*) He is a good-natured *officious* fellow.

(*d*) The footman lost his wits upon some such *trivial* occasion.

(*e*) In their cleanliest *habits.*

(*f*) There are some opinions in which a man should stand *neuter.*

(*g*) The *uncouth* gibberish with which all this was uttered.

(*h*) Sir Roger has brought down a *cunning* man with him to cure the old woman.

8. What groans shall yonder valleys fill!
What shrieks of grief shall rend yon hill!
What tears of burning rage shall thrill,
When mourns thy tribe thy battles done,
Thy fall before the race was won,
Thy sword ungirt ere set of sun!
There breathes not clansman of thy line,
But would have given his life for thine.—
O woe for Alpine's honored Pine!—*Canto VI. St. 22.*

Bred to no business, and born to no estate.—*Sir Roger de Coverley,* *Paper 2.*

(*a*) Point out any figures of Syntax or of rhetoric.

(*b*) Scan the last two lines of poetry.

No. 5.

1. Distinguish between a synonyme and a homonyme and give a synonyme for each of the following:—*tidings, savage, domestic, fictitious, acquiesce*; and a homonyme for *meed, ere, feat, tear, sight.*

2. What is an onomatopoetic word? Give examples of such words.

3. Define the following figures giving an example of each from the Lady of the Lake:—Aposiopesis, pleonasm, antonomasia, epizeuxis, alliteration, metonymy, vision.

4. What is blank verse? Illustrate by a quotation.

5. Scan.—

> The king was in his counting-house,
> Counting out his money;
> The queen was in the kitchen,
> Eating bread and honey.

6. What are the subdivisions of narrative poetry?

7. What is the difference between a metrical romance and a drama?

8. Outline the plot of the Lady of the Lake.

9. How did Scott prepare himself for writing the Lady of the Lake?

10. Wherein does Scott's selection of subjects for his literary works differ from that of other narrative writers?

11. Illustrate Scott's versatility as a writer.

12. Compare Scott and Byron as to treatment of subject in their metrical romances. Contrast Byron's description of the Battle of Waterloo with Scott's description of the Battle of Beal' an Duine.

13. Under what circumstances did Addison write the Campaign? the De Coverley papers?

14. Name Addison's chief dramatic works and state what is meant by the three unities as applied to the drama.

15. Contrast Addison and Swift as to personal character, and as to the style of their writings.

16. Describe the character of Sir Roger's Chaplain, and state the requirements which Sir Roger deemed necessary in this officer; also, sketch either incident which was ended by one of the parties saying that "much might be said on both sides."

17. Give the meanings of the following passages, and state to whom or to what they refer :—

(*a*) Then by my word, the Saxon said,
Thy riddle is already read.

(*b*) The gray-haired sires who know the past
To strangers point the Douglas cast.

(*c*) Nor less upon the saddened town
The evening sunk in sorrow down.

(*d*) To hero bound for battle-strife,
Or bard of martial lay,
'Twere worth ten years of peaceful life,
One glance at their array!

(*e*) Nay, then, my pledge has lost its force,
And stubborn justice holds her course.

(*f*) Upon the death of his mother, the knight ordered all the apartments to be flung open, and exorcised by his chaplain.

(*g*) The parson is always preaching at the squire; and the squire, to be revenged on the parson, never comes to church. The squire has made all his tenants atheists and tithe stealers.

No. 6.

GOLDSMITH.

1. Sketch briefly the following particulars regarding Goldsmith:

(*a*) Give a short account of his education.
(*b*) Give an account of his travels.
(*c*) How did he live after his return to England?
(*d*) Name his most important poetical and prose works.
(*e*) What was his object in writing the "Deserted Village"?
(*f*) For what are his writings most noted?
(*g*) Name his most famous literary contemporaries.

2. (*a*) Quote from the "Deserted Village" lines to show his opinions regarding the accumulation of wealth and the decay of the peasant population.
(*b*) Do facts justify him in holding such opinions?

3. Quote his description of: (*a*) The Village Preacher; (*b*) The Village School-master.

4. (*a*) And, as a hare whom hounds and horns pursue,
Pants to the place from whence at first he flew,
I still had hopes, my long vexations past,
Here to return—and die at home at last.

(*b*) As some tall cliff that lifts its awful form,
Swells from the vale, and midway leaves the storm,
Tho' round its breast the rolling clouds are spread,
Eternal sunshine settles on its head.

1. To what does (*a*) refer? to what (*b*)?
2. Point out any figures.
3. Here to return— Where?
4. Scan lines 3 and 4 of (*a*), and name the metre in which this poem is written.
5. My long vexations past. Expand into a clause and state its grammatical connection.

6 Analyze the words pursue, whence, vexations, eternal, its.

5. Define the following figures: Alliteration, Metonymy, Simile, Enallage, and illustrate each by examples from the "Deserted Village."

6. Paraphrase this passage and parse the words in italics:

O blest *retirement!* friend to life's decline,
Retreats from care, that never must be mine;
How blest is he who crowns, in shades like *these*,
A youth of labor with an age of ease;
Who quits a world where strong temptations try
And, since 'tis hard to combat, learns *to fly;*
For him no wretches born, to work and weep,
Explore the mine, or tempt the dangerous deep;
No surly porter stands in guilty state,
To spurn imploring famine from the gate;
But on he moves to meet his latter end,
Angels around befriending virtue's friend;
Sinks to the grave with unperceived day,
While resignation gently slopes the way;
And all his prospects brightening to the last,
His heaven commences ere the world *be passed.*

No. 7.

DESERTED VILLAGE, &c.

1. (*a*) Give a concise analysis of the Deserted Village.
   (*b*) What was Goldsmith's object in writing it?
   (*c*) What is your opinion regarding the depopulation it deplores and the disorder it laments?

2. Quote his description of the Village Ale House.

3. ——— The man of wealth and pride
Takes up a space that many poor supplied:
Space for his lake, his park's extended bounds,

Space for his horses, equipage, and hounds;
The robe that wraps his limbs in silken sloth,
Has robbed the neighboring fields of half their growth;
His seat, where solitary sports are seen,
Indignant spurns the cottage from the green;
Around the world each needful product flies,
For all the luxuries the world supplies.

(*a*) Point out any figures.

(*b*) Scan the line beginning "Has robbed."

(*c*) Explain the epithet *silken* as applied to *sloth*. Figure?

(*d*) To what does Goldsmith refer in the last two lines?

4. Mary heard them to the end without emotion, and crossing herself in the name of the Father, and of the Son, and of the Holy Ghost, "That soul," said she, "is not worthy the joys of heaven, which repines because the body must endure the stroke of the executioner; and though I did not expect that the Queen of England would set the first example of violating the sacred person of a sovereign prince, I willingly submit to that which Providence has decreed to be my lot."

(*a*) Explain the use of the capital letters.

(*b*) Rewrite this passage, changing it from *direct* narrative to *indirect*.

5. (*a*) Define the following terms: couplet, rhyme, iambus, synecdoche; and illustrate each by an example from the Deserted Village.

(*b*) Give the tests of a pefect rhyme.

6. Thus *fares* the land, by luxury betrayed,
In nature's *simplest* charms at first arrayed,
But verging to decline, its splendors rise,
Its *vistas* strike, its *palaces* surprise,
While, scourged by famine from the smiling land,
The mournful *peasant* leads his *humble* band;
And while he sinks, without one arm to save,
The country blooms—a garden, and a grave.

(*a*) Paraphrase.

(*b*) Quote the lines to which "Thus" refers.

(*c*) Analyze the words in italics.

(*d*) Parse: verging, while (line 5), and garden.

No. 8

1. A writer in the "Quarterly Review" characterizes the prose of Goldsmith as "the most finished model in our language, of purity, facility, and grace." Explain the terms purity, facility, and grace.

2. Campbell says that Goldsmith "uses the ornaments which must alway distinguish true poetry from prose."

Distinguish between poetry and prose, and notice some of the "ornaments" referred to by Campbell.

3. Define onomatopoeia, personification, metonymy, pleonasm, and illustrate each by examples from the "Deserted Village."

4. And thou, sweet Poetry, thou loveliest maid,
Still first to fly where sensual joys invade;
Unfit, in these degenerate times of shame,
To catch the heart, or strike for honest fame;
Dear charming nymph, neglected and decried,
My shame in crowds, my solitary pride:
Thou found'st me poor at first, and keep'st me so;
Thou guide, by which the nobler arts excel,
Thou nurse of every virtue, fare thee well!

(*a*) Paraphrase.

(*b*) "Fare thee well!" Did Goldsmith write any poetry after this? If so, what?

(*c*) Explain the personal allusions.

(*d*) Parse *thee* in the last line.

5. "Perhaps there is no poem in the English language more universally popular than the "Deserted Village." Its best passages are learned in youth, and never quit the memory.—*Chambers' Cycl. of Eng. Lit.*

Point out some of these passages, quoting where you can.

6. (*a*) Give synomyms for shame, sensual, degenerate, charming, inclement, persuasive;

(*b*) And homonymes for throw, port, isle, indite, leaf, knell.

7. In what connection do the following couplets occur:—

(*a*) Those blazing suns that dart a downward ray,
And fiercely shed intolerable day.

(*b*) 'Tis yours to judge, how wide the limits stand
Between a splendid and a happy land.

(*c*) And still they gazed, and still their wonder grew,
That one small head could carry all he knew.

(*d*) Fools who came to scoff remained to pray.

(*e*) And, all his prospects brightening to the last,
His heaven commences ere the world be past.

8. Even now, methinks, as pondering here I stand,
I see the Rural Virtues leave the land.

(*a*) Analyze this sentence.

(*b*) Give the etymology of "methinks."

(*c*) What is an impersonal verb? a defective verb? Give examples of these two kinds of verbs.

English Grammar.--No. 1.

1. Show that the part of speech to which a word belongs depends on its use in the sentence.

What parts of speech may *that*, *but* and *what* be? Give sentences illustrating their use.

2. The verb "to be" is used both as a principal and an auxiliary verb. Give example of all its uses, being particular to state the purpose for which it is used.

3. General terms are of Classic, while specific terms are of Anglo-Saxon origin. Illustrate the truth of this statement.

4. Correct the following where necessary, giving reasons:—

(*a*) I am very pleased.
(*b*) Every one of you should try your best.
(*c*) It lies between either you or your brother or your sister.
(*d*) The crowd were unusually quiet.
(*e*) Boys are of the masculine gender.
(*f*) Those kind of books are better than these kind.
(*g*) Neither of the books are authorized.

5. Explain the uses of the word *self*.

6. What different ways are employed to express the plural in English? State precisely what is peculiar in the words *brethren*, *kine* and *children*.

7. "Now, *man* to man, and steel to steel,
A *Chieftain's vengeance* thou *shalt feel*."

(*a*) What kind of a phrase is "man to man."
(*b*) Parse the words in italics.
(*c*) Distinguish between phrase and clause.

8. Distinguish between the following :—

(*a*) The king's picture. The picture of the king.
(*b*) The Lord's day. The day of the Lord.
(*c*) I have little money. I have a little money.
(*d*) John loves James better than him. John loves James better than he.
(*e*) The lion's mane. The mane of the lion.

9. Decline the relative pronouns. Give rules for their correct use. When must *that* take the place of *who* and *which* ?

10. "'Now, *truce*, *farewell !* and, ruth, begone !
Yet think not that by thee alone,
Proud chief, can courtesy be shown ;
Though not from copse, or heath, or cairn,
Start at my whistle clansmen stern,
Of this small horn one feeble blast
Would fearful odds against thee cast.
But fear not—doubt not—which thou wilt—
We try this quarrel *hilt* to hilt.'
Then each at once his falchion drew,
Each on the ground his scabbard threw,
Each looked to sun, and stream, and plain,
As what *they* ne'er might see again ;
Then foot, and point, and eye opposed,
In dubious strife they darkly closed."

(*a*) Give the etymology of chief, falchion, plain, ne'er, dubious.
(*b*) Parse the words in italics.
(*c*) Analyze the last six lines.
(*d*) Note any false syntax in them.

No. 2.

1. Name the inflections of each part of speech; define gender; distinguish between gender and sex; and give examples of the different modes of distinguishing masculine and feminine nouns.

2. Define case. If case is regarded as an inflection only, what part of speech has three cases? Why should the noun have only two cases?

3. What adjectives cannot be compared? Give rules for the correct use of the comparative and the superlative degree.

4. How are subordinate sentences connected with principal ones? Give examples illustrating your answer.

5. Classify the words ending in "ing" in the following sentences as to part of speech:—

(*a*) John lost his walking-stick.

(*b*) Loving our fellow-men is one of our duties.

(*c*) James is a loving child.

(*d*) Respecting ourselves, we shall be respected by the world.

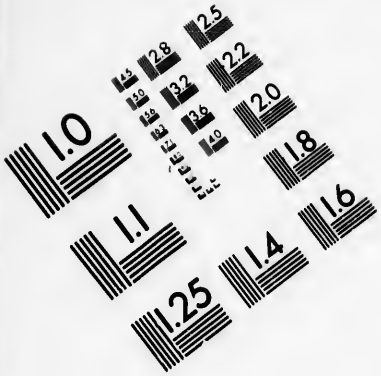
(*e*) Your duty consists in maintaining the laws.

(*f*) Speaking generally, this will be found correct.

6. Define an absolute phrase. Give two sentences containing this kind of phrase; in what part of the analysis must this phrase appear?

7. The Douglas, who had bent his way
From Cambus-Kenneth's abbey grey,
Now as he climbed the rocky shelf,
Held sad communion with himself:—

[redacted]



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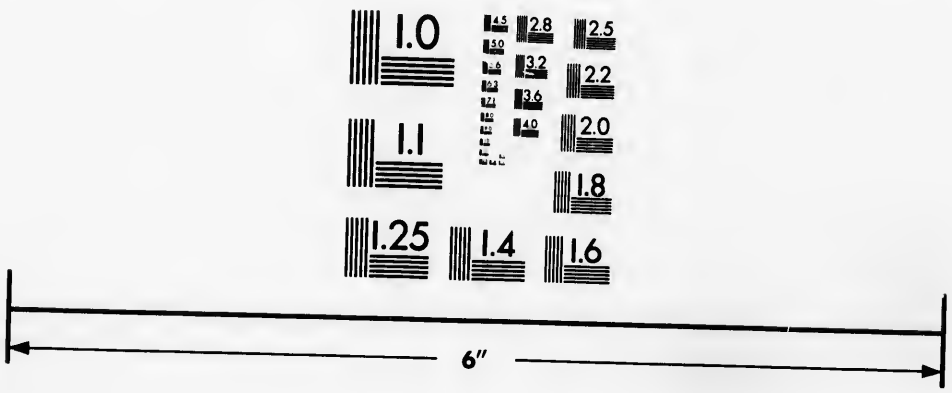

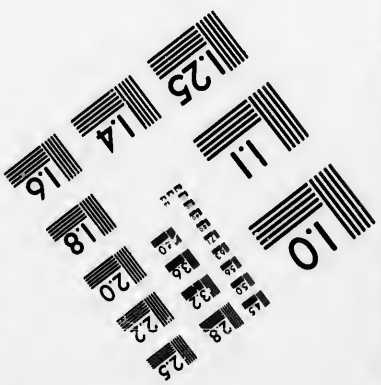

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'Yes! All is true my fears could frame;
A *prisoner* lies the noble Græme,
And fiery Roderick soon will feel
The vengeance of the royal steel,
I, only I, can ward their fate—
God *grant* the ransom come not late!
The Abbess hath her promise given,
My child shall be the bride of Heaven;
—Be pardoned one *repining* tear!
For He, who gave her, knows *how* dear,
How excellent! but that is *by*,
And now my business is—*to die.*'

Stanza xx., Canto V.

(*a*) Select the clauses and explain clearly what relation they bear to the principal sentences.

(*b*) Parse the words in italics.

(*c*) Give the etymology of communion, prisoner, vengeance, royal, business, ransom, excellent, sovereign, pageant, and abbess.

(*d*) Point out any figures of syntax or of rhetoric which occur.

(*e*) Analyze from *yes* to *late.*

8. Correct the following where necessary, giving reasons:—

(*a*) This word I have only found in Spenser.

(*b*) I wrote to my brother before I received his letter.

(*c*) Many sentences are miserably mangled, and the force of the emphasis totally lost.

(*d*) This construction sounds rather harshly.

(*e*) Whatever a man conceives clearly, he may put it into distinct propositions, and express it clearly to others.

Grammar.--No. 3.

1. How is the *absence* of case-endings supplied in English? Illustrate the effect of this *absence* on the general structure of sentences.

2. Classify in tabular form the various pronouns. Decline the pronouns *I*, *she*, *that*, and *who*.

3. Explain and illustrate the restrictive and continuative force of the relative pronouns.

4. Explain the terms *weak* and *strong* as applied to the conjugation of verbs. To which conjugation do the following verbs belong:—*buy*, *fight*, *creep*, *can*, *clothe*, *flee*, and *shoot*.

5. State the various relations which words and groups of words bear to each other in a sentence. Illustrate each kind of relation by an example.

6. Define the following:—*simple sentence*, *complex sentence*, *compound sentence*. 7. Correct or justify the following, in each case giving your reasons.

(*a*) Extravagance as well as parsimony are to be avoided.
(*b*) "Our completest dictionaries."
(*c*) "Newspaper usage and oral usage has made this word synonymous with amount."
(*d*) "I am verily a man who am a Jew."
(*e*) "Neither precept nor discipline are so forcible as example.
(*f*) "It is not me who he is in love with."
(*g*) "The thunder was heard roll over our heads."
(*h*) "He lay like a warrior taking his rest."

8. What is "to" in the following:—*To-morrow, early to bed, go to now, such a to-do.*

9 State the chief sources whence English words have been derived. What terms are, in general, of Anglo Saxon origin?

10. Gravely he greets each city sire,
Commends each *pageant's* quaint attire,
Gives to the dancers thanks aloud,
And smiles and nods upon the crowd,
Who rend the heavens with their acclaims,
'Long *live* the Commons' King, King James!'
Behind the King thronged peer and knight,
And noble dame and damsel bright,
Whose fiery steeds ill brooked the stay
Of the steep street and crowded way.
—But in the train you might discern
Dark lowering brow and visage stern;
There nobles mourned their pride restrained,
And the mean burgher's joys disdained;
And chiefs who, hostage for their clan,
Were each from home a banished man,
There thought upon their own gray tower,
Their waving woods, their feudal power,
And deemed *themselves* a shameful *part*
Of pageant *which* they cursed in heart.

St. xxi. Canto v.

(*a*) Analyze from *nods* to *way*.
(*b*) Parse the words in italics.
(*c*) Point out any figures of s x, or of rhetoric which occur.
(*d*) Give the etymology of quaint, damsel, train, might, restrained, chief, hostage, banished, and fiery.

No. 4.

1. "Mention any English nouns which form their plurals by processes generally obsolete. Which of the following are genuine plurals, and account for the forms which are not such:—*alms, summons, banns, costs, eaves, weeds, riches*, and *dice*?"

2. Distinguish between co-ordinate and subordinate conjunctions. Also between conjunctions and connectives. What are the various uses of the word *but* in English?

3. How are degrees of comparison formed in English? Give three examples of each mode. Compare the irregular forms, *worse, first, elder, farther, further,* and *next.*

4. Explain the following terms:—*Collective noun, verbal noun, reflective verb, impersonal verb,* and *defective verb.*

5. Define the following and illustrate your definitions by examples:—*Phrase, clause, sentence.*

6. "At what different periods has a Latin element been introduced into our language? Give examples of words introduced in the several periods mentioned."

7. Correct the following where necessary, giving reasons:—

(*a*) "You will soon find such peace which it is not in the power of the world to give."

(*b*) "In proportion as either of these qualities (perspicuity and sublimity) are wanting, the language is imperfect."

(*c*) "Many writers employ their wit in propagating of vice."

(*d*) "As soon as they are made, they are instantly lost."

(*e*) "The more important rules, definitions, and observations, and which are therefore the most proper to be committed to memory, are printed with a larger type."

8. "But not a glance from that proud ring
Of peers who circled round the King,
With Douglas held communion kind,
Or called the banished man to mind;
No, not from those who, at the chase,
Once held his *side* the honored place,
Begirt his board, and, in the field,
Found safety underneath his shield;

For *he*, whom royal eyes disown,
When was his form *to* courtiers *known* !

Canto V., St. 24.

(*a*) Write in prose and analyze.
(*b*) What is a *hybrid?* Select any in the above passage.
(*c*) Parse the words in italics.

9. Parse the words in italics, in the following :—
(*a*) "Douglas *would* speak, but in his breast
His struggling soul his *words* suppressed."

Canto V., St. 23.

(*b*) "I shame *me* of the part I played."

Canto VI., St. 8.

(*c*) "Nor *wot we* how a name—a word—
Makes clansmen vassals to a lord."

Canto VI., St. 11.

10. What is the antecedent of we in (c) ?

11. Give the etymology of the following :—*courtiers, lord, sullen, caitiff, lorn, exile, savage, buxom, kerchief,* and *purvey.* State the use of the prefix *be* in the formation of words.

No. 5.

1. "The meaning of the possessive case is sometimes expressed by means of the preposition *of*, with the objective case after it." Show that the two forms do not always express the same meaning.

2. What different relations of words to each other are included under the name of *Objective Case* in English.

3. Define *Mood.* Why is the *Subjunctive Mood* so called. Give an example of this mood occurring in an independent sentence.

4. What is meant by conjugating a verb ? Name the principal parts of a verb in English. Ascertain to which conjugation the following verbs belong by giving their

principal parts :—*slide, climb, spread, fight, espy, awake, hit, go, beware, mow,* and *reeve.*

5. Distinguish between *subject* and *nominative*, and between *object* and *objective*. Illustrate your answer by examples.

6. "Place each of the following phrases in a sentence of your own construction, so as to illustrate the way in which it may be properly used :—*Better than he, better than him, than whom, and which, as good as I, as good as me, the wiser man, would that, sixty-head.*"

7. Form five derivatives from each of the following root words, by means of any of the following prefixes and suffixes; and give the literal meaning of each derivative :—Roots, *cudo, duco, facio,* and *frango.*

Prefixes and suffixes, *ure, in, ion, ad, al, ence, se, de, or, ob, ure, ile.*

8. Criticize the following :—

(*a*) "When you are sufficiently matured for the enjoyment of poetry of any kind, you will take delight in reading Chaucer for yourself, with no other aid but the notes of the learned editor."

(*b*) "Hardly knowing whether they shall become such or no."

(*c*) "We had sooner read a book of Archbishop Trench's."

(*d*) "The horse ran away with a gig, threw out the driver and cut a severe gash in one of his hind legs."

(*e*) "How can we define that whose being, whose action, whose conditions, whose limitations we cannot comprehend.

(*f*) "A scientific vocabulary of not less than 300000 words."

(*g*) "There is a large class of clergymen who know the difficulty of making themselves heard, without knowing the right method to overcome it."

9. Parse the underlined words in the following :—

And *with* that gallant pastime *reft*
Were all of Douglas I have left. *Canto II. St. 26.*

He grieved, *that day* their games cut short,
And marred the dicer's brawling sport. *Canto VI. St. 4.*

Tenth in descent, since first my sires
Waked for his noble house their lyres,
Nor one of all the race *was known*
But prized its weal above *their* own. *Canto VI. St. 11.*

One blast upon his bugle-horn
Were worth a thousand men. *Canto VI, St. 18.*

Old Allan-bane looked on *aghast*,
While grim and *still* his spirit passed. *Canto VI. St. 21.*

Nobody presumes to stir till Sir Roger *is gone* out of the Church.

10. Account for the "h" in aghast, for the "l" in could, and for the "s" in island; and give the etymology of *dangerous, scouts, eyry, humor, dungeon*, and *peregrinations*.

11. Nay, Douglas, nay,
Steal not my proselyte away!
The riddle 'tis my right to read,
That brought this happy chance to speed.
Yes, Ellen, when disguised I stray,
In life's more low but happier way,
'Tis under name which veils my power,
Nor falsely veils—for Stirling's tower
Of yore the name of Snowdoun claims,
And Normans call me James Fitz-James.

Canto VI.—St. 28.

(*a*) Analyze.

(*b*) How is *it* in line 3 used?

(*c*) Parse *that* in line 4.

12. Explain the origin, and give the force of the following terminations :—*ly, ster, ee, ice, al, able, ent, ty;* and give the meaning of *un* in *untie, undo, unkind,* and *unloose*.

No. 6.

1. What is a letter? Show that the English alphabet is *defective*, *redundant*, and *inconsistent*.

2. Explain the following terms, giving an illustration of each: *Inflection, declension, conjugation, voice, mood, case.*

3. Distinguish between *fish* and *fishes*; *fowl* and *fowls*; *pence* and *pennies*, all being plural. Give the feminine of *bachelor, earl, wizard, fox, sultana.*

4. Distinguish between the *reflective* and *emphatic* pronouns, giving examples to illustrate your answer.

5. What forms of inflection, not regarding auxiliary verbs as forming such, are found in English verbs? Illustrate by examples.

6. Distinguish between the use of *shall* and *will*, giving examples of their proper use in each person.

7. Why cannot words be classified as to part of speech unless they are in a sentence? Illustrate your answer by stating the part of speech, with reason, of each of the italicized words in the following:—

(*a*) I see men as trees *walking.*
(*b*) Spare not for *spoiling* of thy steed.
(*c*) *If* me no *ifs.*
(*d*) He said *that that that that that* boy parsed was not the *that that* Mary referred to.

8. Select ten of the following words, give their etymology, and derive their meaning from the meaning of their component parts:—*farewell, glaive, unreflected, defied, except, but, between, astray, perhaps, rebellious, gosling, forsooth, stranger, dubious, supplied, squires.*

9. From which of the sources of the English language are the following words derived? Give the literal meaning of each:—*King, witness, harbinger, interlunar, atheist, response, profane, husband, neuter, relations.*

10. Give the meaning of the prefix in the words *ashore, avert,* and *apathy;* in *antecedent* and *antipodes,* and account for the difference of meaning.

11. Correct or justify the following, giving reasons : —

(*a*) They that honor me, I will honor.

(*b*) O fairest flower, no sooner blown but blasted.

(*c*) Forever in this humble cell
Let thee and I, my fair one, dwell.

(*d*) Better to leave undone, than by our deeds acquire
Too high a fame, when him we serve's away.

(*e*) —Him I accuse
The city gates has entered.

(*f*) The man Moses was very meek, above all the men which were upon the face of the earth.

(*g*) Let us make a covenant, I and thou.

(*h*) The atrocious crime of being a young man I shall neither attempt to palliate or deny.

(*i*) The priests transmitted to the ignorant population the instruction which they themselves were unable to acquire.

12. (1) For *thee* rash youth, no suppliant sues,
From thee *may* Vengeance claim her dues.
Who, nurtured underneath our smile,
Hast paid our care by treacherous wile,
And sought, amid thy faithful clan,
A refuge for an outlawed man,
Dishonoring thus thy loyal name.—
Fetters and warder for the Græme.

(2) With lifted hands and eyes, they prayed
For blessings on his generous head,
Who for his country felt *alone*,
And prized her blood beyond *his own*.

(*a*) Analyze both passages.

(*b*) Parse the words in italics.

(*c*) Select the clauses and show their dependence on the principal sentences.

(*d*) Point out any figures of speech.

(*e*) Select the adjectival phrases and state to what word each is an attribute.

No. 7.

1. Define the following terms :—
   (*a*). Vowel, syllable, word, trisyllable, accent.
   (*b*). Divide the following words in syllables, and state on which syllable the accent falls : Hymeneal, museum, recess, artificer, ally.
2. (*a*). Define Etymology.
   (*b*). In what different ways may words be classified, and state the classes under each mode ?
   (*c*). How often have I paused on every charm,
   The sheltered cot, the cultivated farm,
   The never failing brook, the busy mill,
   The decent church that topt the neighboring hill,
   The hawthorn bush, with seats beneath the shade,
   For talking age and whispering lovers made !
   (1). Select the *primitive* words ; and
   (2). The *compound* words.
   (3). Give a list of words of a similar origin to whisper.
3. (*a*). State the three ways of distinguishing the Gender of Nouns and give three examples of each way.
   (*b*). Give the masculine word corresponding to hind, nun, governess, witch ; the feminine word corresponding to tiger, adjutor, Czar, Don, Infante.
4. (*a*). What is the rule for forming the plural of foreign nouns ?
   (*b*). Give the plural form of the following words, and state the meaning of both the singular and plural forms : vesper, domino, corn, compass, iron.
5. (*a*). Define Case.
   (*b*). Distinguish between Case and Relation ; between the Nominative and Subject ; between the Object and Objective.

(*c*). State the case of each of the words in *italics*, with your reason :

(1). "Sweet *Auburn*," &c.

(2). *Plato*, thou reasonest well.

(3). James tore *John*, the baker's, coat.

(4). They elected James *chairman*.

(5). He seems an honest *man*.

(6). *This* said, he sat down.

6. (*a*). Name the different kinds of adjectives.

(*b*). What adjectives can be compared ?

(*c*). Compare the following : heavy, sad, barren, old, lovely, much, uninteresting.

7. "I venerate the man *whose* heart *is warm*,
Whose hands are pure, whose doctrine and whose life,
Coincident, exhibit lucid proof
That he is honest in the sacred cause."

(*a*) Analyze.

(*b*) Parse the words in italics.

8. Give the etymology of the following : swain, innocence, charm, decent, simply, wealth, supplied, peasantry.

9. "Works its weedy way."

(*a*) What peculiarity of poetry is illustrated by these words ?

(*b*) Quote passages illustrating this peculiarity.

10. Correct or justify the following :

(*a*) —"I shall not lag behind, nor err
The way, thou leading"—

(*b*) "We have done many things which we ought not to have done."

(*c*) "No mightier than thyself or me."

(*d*) "Wherein doth sit the dread and fear of kings."

(*e*) 'There was racing and chasing on Cannobie Lea."

(*f*) Two and two are four.

(*g*) Twice two are four.

No. 8.

1. Define the following terms: Etymology, proper diphthong, metre, inflection, clause.

2. (*a*) Classify the Pronouns and define Relative Pronoun, Demonstrative Pronoun, and Interrogative Pronoun.

(*b*) Show by examples that Relative Pronouns may introduce other than adjectival sentences.

3. (*a*) Give rules for forming the plural.

(*b*) Give the plural of belief, beef, series, sir, maid-of-honor; and the singular of kine, tongs, geniuses, genera, and apparatus.

4. (*a*) They strike *each other*. Parse the words each and other.

(*b*) Why are these words called reciprocal pronouns?

5. (*a*) Show by examples how to distinguish the participial form "ing" from the gerundial form.

(*b*) Parse the words in italics:

(1) The clock struck the hour for *retiring*.

(2) Trembling, *shrinking* from the spoiler's hand,
Far, far away thy children leave the land.

(3) At his control, despair and anguish fled the *struggling* soul.

6. (*a*) What is meant by the principal parts of a verb?

(*b*) Give the principal parts of the following verbs: clothe, dare (to venture), reeve, lay, mow, bear (to carry), and work.

(*c*) Inflect the verb "to see" in the *Present Imperfect* and *Progressive Indicative*; *Future Perfect Indicative*, and *Present Indefinite Subjunctive*.

7. Show by examples with the word *but* that the part o speech which a word is depends upon its use in the sentence

8. Here, as I take my solitary rounds,
Amidst thy tangling walks, and ruined grounds,
And, many a year elapsed, return to view
Where once the cottage stood, the hawthorn grew,
Remembrance wakes with all her busy train,
Swells at my breast, and turns the past to pain.

(*a*) Write the three complex sentences in full.

(*b*) Analyze that which has *turns* for grammatical predicate.

(*c*) Year. Give its case and quote the rule of Syntax.

(*d*) Select the words of classic origin.

(*e*) Analyze any five of the following: retreats, surly, nightingale, murmurs, pensive, fashioned, guests, champion, vacant.

9. In the following sentences select the infinitives. State whether they are *true* or *gerundial*, with reasons:

(*a*) John came to see the game.

(*b*) John likes to win.

(*c*) I will go.

(*d*) John has a house to let.

(*e*) She, wretched matron! forced, in age, for bread,
To strip the brook with mantling cresses spread.

10. Criticise the following:

(*a*) Whom say ye that I am?

(*b*) Whom the gods love die young.

(*c*) He sat him down on a pillar's base.

(*d*) Nine out of every ten of the boys was looking as wise as a philosopher.

(*e*) It is now about four hundred years since the art of multiplying books has been discovered.

(*f*) This is seldom or ever the case.

No. 9.

1. (*a*) Define the following: Voice, mood, strong verb.

(*b*) Of what use is the passive voice?

(*c*) Why cannot intransitive verbs be used in the passive voice?

2. (*a*) What is a participle?

Write the following participles of the verb to strike:

(1) Imperfect participle. (2) Perfect participle passive. (3) Simple perfect participle. (4) Perfect participle active, (compound).

3. Mason says all adjectives are used either *attributively* or *predicatively*. Distinguish between these uses of the adjective. Give examples of each use.

4. (*a*) What is a conjunction?

(*b*) Distinguish between conjunctions, relative pronouns, and relative adverbs.

5. (*a*) What is an adverb? (*b*) Give examples of adverbs derived from adverbs, from pronouns, from verbs, and from numeral adjectives.

(*c*) What is the difference in meaning between "ly" as a suffix forming an adverb and forming an adjective.

6. Write sentences showing the use of *that*, (1) as a relative pronoun, (2) as a demonstrative adjective, (3) as a conjunction, (4) as a demonstrative pronoun.

7. (*a*) Explain the use of the words '*it*' and '*there*' in the sentences "It is certain that snow lies on the top of the Alps." "There are many people in the room."

(*b*) Parse these two words.

8. "His lovely daughter, lovelier in her tears,
The fond companion of his helpless years,
Silent went next, neglectful of her charms,
And left a *lover's* for a father's arms,
With louder plaints the mother spoke her woes,
And blessed the cot where every pleasure rose;
And kissed her thoughtless babes with *many* a tear,
And clasped them *close*, in sorrow doubly dear:
Whilst her fond husband strove to lend relief
In all the manliness of grief."

(*a*) Illustrate from the above passage what you understand (1) by a simple sentence, (2) by a complex sentence, and (3) by a compound sentence.

(*b*) Analyze the first four lines.

(*c*) What is a clause? Select any in the above passage.

(*d*) Parse the words in italics.

(*e*) Lovelier—Give rules for forming the comparative and superlative of adjectives.

9. Criticise the following:—

(*a*) The ends of a divine and human legislator are vastly different.

(*b*) The ebb and flow of the tide were explained by Newton.

(*c*) Then there was a steel axe, or hammer, called a mace-of-arms, and which hung to the saddle-bow.

(*d*) If I am not mistaken, a government can only be called democratic where a majority of adults are sovereign.

(*e*) The facts, premises, and conclusions, of a subject, sometimes naturally point out the separation into paragraphs: and each of these, when of great length, will again require subdivision at their most distinctive parts.

(*f*) A man may see a metaphor or an allegory in a picture, as well as read them in a description.

10. (*a*) Analyze the following words: intolerable, savage, insidious, dependent.

(*b*) Account for the difference of spelling of legal and loyal, though both are derived from the same Latin root.

(*c*) Give the suffix and literal meaning of hamlet, bullet, pumpkin, farthing, Wilkin.

(*d*) Divide the following into syllables and mark the accented syllable: Precedence, premature, venison, facial, Mogul.

Geography—No. 1.

1. What causes the succession of the seasons? Is the sun north or south of the equator at the present time, and how far?

2. What are zones? How is the position of the lines which mark their boundaries determined?

3. Name the various oceanic currents, and state in what way they affect climate. Give examples.

4. Draw an outline map of Europe, and insert the names of the chief seas, capes, and mountain chains; trace the course of the Rhine, Seine, Tiber, Vistula, and Volga; and mark the position of Paris, Tours, Berne, Christiania, Naples, Ulm, Augsburg, Talavera, Trieste.

5. Name the States of the American Union that border on each of the great lakes, those that border on the Gulf of Mexico, and those that lie west of the Mississippi. Trace the course of (1) the Ohio, (2) the Missouri, (3) the Potomac.

6. Name the counties of Ontario, (1) that border on Lake Erie, (2) that border on the St. Lawrence. Trace the course of the Grand River, Red River, and the Saskatchewan.

7. Name the principal islands of Europe, and state to whom they belong. Name the West India Islands that belong to Great Britain.

8. Name the counties of England (1) that border on the Thames, (2) that border on the English Channel, (3) that border on Wales.

9. Several Asiatic rivers rise in Thibet. Name them, and trace them to the sea.

No. 2.

1. Two persons, *A* and *B*, standing on the Arctic circle, 180° apart, can see the sun at the same time on June 21st. If it is twelve o'clock noon when *A* sees it, what is the time with *B*, and in what direction must each look to see it ?

2. Places on the western sides of the continents bordering on the North Atlantic and Pacific are warmer than places in the same latitude on the eastern sides of the continents bordering on these oceans. Account for this.

3. It has been suggested that the trade winds blowing constantly against such obstructions as the Andes Mountains would greatly retard the rotation of the earth, and ultimately cause its diurnal motion to cease. Why cannot this occur ? Explain fully.

4. Enumerate all the points of difference between latitude and longitude.

5. Define the term climate. State the general law on which the climate of a place depends, and enumerate the various circumstances which modify the general law.

6. A place, *A*, is 9° 17′ and 20″ east of a place, *B* ; when it is 10.25 a.m. at *B*, what is the time at *A* ?

7. State the religion and the form of government of the following countries (answer in tabular form) :—Canada, Chili, Japan, France, Russia, China, Persia, Denmark, Italy and Egypt.

8. Where and what are the following (answer in tabular form) :—Oruro, Pittsburgh, Etna, Everest, Aden, Manilla, Luzon, Livingstone, Titicaca, Merv, and Herat ?

9. Name the divisions of South Africa. Who are the Boers? What is the Transvaal ?

No. 3.

1. How are tides produced? "The tides are greater than ordinary twice every month, viz., at the times of new and full moon." Explain this clearly, illustrating by diagrams.

2. Draw a diagram showing the position of the earth in her orbit on the 1st of March.

3. State the cause and trace the course of the Gulf Stream.

4. Two men start from Toronto and travel around the world arriving home on the same day; the man that went West, says it is Saturday; what day does the other say it is? What day is it?

5. Enumerate the principal mineral and vegetable products of America, and mention the parts from which those products are chiefly exported.

6. Draw, on your writing-paper, a map of the Australian Continent, marking out the boundaries of the several British Colonies, the situation of the chief towns, and the course of the principal rivers.

7. Draw a map of Hindostan; and mark out the boundaries of the three Presidencies, the direction of the principal rivers, and the great mountain ranges.

8. Trace carefully, in words, or by drawing a map, the course of the Rhine, the Danube, the Shannon, the Mississippi; and name the towns on their banks, and important places near them.

9. You wish to go from Toronto to Auckland. Give a sketch of your route, naming important places through which you pass.

10. Describe the position of the following places, and say for what they are remarkable:—Pietermaritzburg, Aden, Honolulu, Sarawak, Dunbar, the Boyne, Rouen, Runnymede.

No. 4.

1. Define the following :—*Aphelion, perigee, solstice, great circle,* and *equinoctial line.*

When do the solstices occur?
Name three great circles.

2. What is meant by the *phases* of the moon? Account for them.

3. Account for the position of the tropics and polar circles. If the axis of the earth made an angle of 63° with the plane of its orbit, what would be the width of the *temperate zones?*

4. What is an eclipse? What causes eclipses?
Why are there not two each month?

5. Name the British possessions in Europe and Africa.

6. What countries own the following :—*Goa, Jamaica, Greenland, Borneo, Azores, Falkland Islands, Bermudas, Samana, Sandwich Islands,* and *Trinidad.*

7. Where are the coal regions of Canada?

8. Name the great sea-ports of the Baltic and the chief exports from them.

9. Name the countries of Europe and their capitals; also state the form of government and prevailing religion of each. (Answer in tabular form.)

10 Where and what are the following (answer in tabular form) :—Herzegovina, Plymouth Rock, Valetta, Sandy Hook, Father Point, Shipka, Alderney, Guernsey, Luzon, and Xeres.

No. 5.

1. Define the following :—zone, isothermal lines, isotheral lines, isochimenal lines, geysers, glaciers. Name the parallels of latitude which bound the zones.

2. Describe the phenomena presented by the *land and sea breezes*, and state the causes to which they are due.

3. Why is the rainfall heavy in Brazil and along the west coast of Patagonia, and almost nothing in the Sahara?

4. Distinguish between *watershed* and *river-basin*, and give illustrations of your answer from the maps of North America and Europe.

5. A foreign vessel reaches New York laden with rice, tea, cotton, silk, and porcelain ware; from what country did she probably come? Why?

6. Assign causes for the great commercial prosperity of Great Britain.

7. Name the chief islands of the Atlantic Ocean, and state the nations to which they belong. Where is the Peak of Teneriffe?

8. Draw a map of the Dominion of Canada from Manitoba eastward; show on it the great lakes between Canada and the United States and their connections; and mark the position of Collingwood, Simcoe, Peterborough, Lindsay, Stratford, St. Hyacinthe, Three Rivers, Pictou, Chatham (N. B.,) and Yarmouth.

9. If you turn to the map of Asia you will find a number of islands lying to the south of Malacca, and forming a link between Asia and Australia.

Name the islands, and explain the statement in the latter part of the extract.

10. Name the colonies or possessions to which the following towns belong, and state any fact of interest in connection with each:—Adelaide, Quebec, Valetta, Galle, Cape Town, Wellington, Georgetown, Victoria, Ballarat, and Spanish Town.

No. 6.

1. Give proofs of the sphericity of the earth, and also of its diurnal motion.

2. Explain the cause of the Trade Winds. Why do they not blow in the Indian Ocean?

3. How is the latitude of a place determined by knowing the *Meridian Altitude* and *Declination* of the sun?

At a place on March 20th., the meridian altitude of the sun is 47° and when it is 9.15 a.m. at Greenwich it is 10.36 a.m. at this place; find its latitude and longitude.

4. Why does the day vary in length, and why is it longer during summer than during winter? Draw a diagram showing the position of the earth in her orbit to-day, marking by an arrow the direction in which she is moving.

5. Compare the corresponding latitudes of Europe and North America in regard to climate, and explain the cause for any existing difference. Which receives the greater amount of the sun's heat, the northern or southern hemisphere? Why?

6. Trace the course of the Ganges and of the Indus. Name the most important places on them, and also the passes leading from India into Afghanistan.

7. Name the most important islands to the east and south-east of Asia, and state the country to which each of these belongs.

8. Describe the great river basins of South America, and name the rivers which drain each and the direction in which they flow.

9. What are the most important exports from each of the following places:—Montreal, Charleston, New Orleans, Buenos Ayres, and Liverpool.

10. Describe the position of, and state for what each of the following places is noted:—Granada, Leipsig, Leeds, Saratoga, Salamanca, Delhi, Pultowa, Cronstadt, Utrecht, and Lyons.

No. 7.

1. Define the following: mathematical geography, physical geography, axis, oblate spheroid, eclipse.

2. State a variety of facts which go to prove that the earth is spherical in shape.

Draw a diagram illustrating an eclipse of the sun; explain why there are not two eclipses every month.

3. The earth is said to rotate on its axis *once* every twenty-four hours. Is this correct? Why?

4. Give your reasons for supposing that the earth rotates on its axis, and revolves about the sun.

5. Supply the blanks in the passage:

The —— of America include all that territory which stretches from the Gulf —— and —— northward to the —— of ——, and also a large —— which lies to the north-west of —— and is called ——. The —— consist of —— States, —— Territories, and one ——. The capital of the —— is —— in the District —— on the River ——. This vast territory is divided into three great natural regions: 1st, the —— slope; 2nd, the —— Valley; 3rd, the —— slope.

6. A vessel sails from Chicago to Liverpool, in England; state in order the waters it would traverse. What would likely form its cargo going and returning?

7. Name the chief commercial cities of North America, and state where each is situated.

8. Name the largest islands of each of the following groups: Greater Antilles, Phillipine, Balearic, Japan; and state to what country the following belong: Azores, Canary, Trinidad, Sandwich, Madagascar, Goa, Pondicherry.

9. Name the Continents, 1st, in the order of their size; 2nd, in the order of their population; 3rd, in the order of their extent of coast line.

10. Name the counties of Ontario; 1st, bordering on the Ottawa; 2nd, bordering on Lake St. Clair; 3rd, bordering on the Niagara River. State by what different routes a person may journey from London to Peterborough.

No. 8.

1. (*a*) Define Latitude and Longitude.

   (*b*) Why are degrees of latitude, speaking generally, of the same length, and degrees of longitude of different lengths?

   (*c*) What terms applied to the heavens correspond to latitude and longitude?

2. (*a*) Define the terms Solstice and Equinox.

   (*b*) When do the autumnal equinox and the summer solstice occur to the people of Melbourne, Australia?

3. Name the chief islands of the Atlantic Ocean, and state the countries to which each belongs.

4. (*a*) Name the Gulf States of the American Union.

   (*b*) What are their chief products?

   (*c*) What are their most important commercial towns? Give one at least in each State.

5. Describe the situation, and state the form of government and capital of the following: Saxony, Roumania, Bavaria, Servia, Bulgaria, Wurtemberg, Eastern Roumelia, Montenegro.

6. A vessel sails from Riga to Quebec, calling at Liverpool, by the shortest route. State in order through what waters she would have to pass, and what would likely form her cargo.

7. Sketch a map of Australia, showing the various colonies, their capitals, and three large rivers.

8. Where are the following places situated, and state any historical event with which each is associated: Saratoga,

Queenston Heights, Yorktown, Austerlitz, Tilsit, Sedan, Delhi, Acre, Nantes, Culloden.

9. Give a general description of the great physical features of Asia. Refer to its table-lands, mountains, rivers, and deserts.

10. What are the chief articles of commerce supplied to Great Britain by Canada, Newfoundland, the West Indies, Australia, Cape Colony?

No. 9.

1. (*a*) Define *Declination* and *Meridian Altitude*.

   (*b*) The declination of the sun on a certain day is 10° 15′ south; its meridian altitude is found to be 60° 45′; what may be the latitude of the place where the observation is made?

2. (*a*) What is a chronometer? How is it used for determining the longitude of a place?

   (*b*) When it is 9.40 a.m. at *A*, what is the time at *B*, which is 10° 14′ 15″ west of *A*.

   (*c*) *A* is in east longitude 16° 14′; *B* is in west longitude 10° 16′; when it is 6 p.m. at *B*, what is the time at *A*?

3. (*a*) Draw a diagram illustrating the position of the earth in its orbit at the soltices and at the equinoxes, marking with an arrow the direction in which the earth moves in its orbit.

(*b*) The earth is nearer the sun during our winter than during summer. Explain fully why it is colder when we are nearest the sun.

4. (*a*) Explain the following terms:—Centrifugal force, centripetal force, and tangential force.

(*b*) Why is the orbit of the earth elliptical?

5. (*a*) To what circumstances does Great Britain owe her commercial importance?

(*b*) Name her great sea-ports and state where each is situated?

6. (*a*) Name in order the States and Territories of the American Union which border on Canada, beginning with the most eastern.

(*b*) Name the largest town in each of these States, and describe its situation.

7. Name the most important islands situated south and east of Asia, and state to what country each belongs and for what each is remarkable. Answer in tabular form.

8. Assign the following Provinces to their respective countries:—Silesia, Astrakhan, Armenia, Tuscany, Venetia, Moravia, Bohemia, Andalucia, Ulster, Roumelia.

9. Describe the great physical features of South America, and state the direction of the chief rivers and where they empty.

10. Sketch a map of the Continent of North America, outline the Provinces of the Dominion, and mark the position of the capital of each.

History—No. 1.

1. When did the Romans first enter Britain? When did they finally leave it? Mention some of the chief benefits derived from their occupation.

2. Describe the events which seated a Danish dynasty on the English throne at the beginning of the eleventh century.

3. How and when did England first gain a footing in Ireland?

4. From what occasion do you date the origin of the House of Commons in its present form? What kinds of Assembly were there in earlier times out of which it may be supposed to have grown?

5. It has been said that the Tudors knew when to give way, and the Stuarts did not know. Is this statement borne out by facts?

6. Account for the popularity of Charles II., and the unpopularity of William III.

7. Give the dates and results of the most important battles fought between Charles I. and his Parliament, and a description of one of them.

8. Trace the descent of Queen Victoria from Henry VII.

9. State briefly the cause which led to the "War of 1812." Name the principal battles fought during the war and the leaders on each side.

10. What was the cause of the Rebellion of 1837? Name the principal persons concerned in it, and give a short account of any one of them.

No. 2.

1. How did the contest between Rome and Carthage originate and terminate? What great issues were involved in the Punic Wars?

2. Give a short account of the Second Punic War, stating the principal battles fought during the war, and the leaders on each side.

3. Point out any circumstances in the condition of Italy, and the relation between its peoples and Rome, favorable to the prospects of Hannibal's invasion.

4. What led the Romans to interfere (1) in the affairs of Greece, (2) in the affairs of the East?

5. Specify the causes and give a short account of the events of the Social or Marsian War.

6. Give an account of Sylla's return, and his capture of Rome after the death of Marius, and of his proscriptions, with the date.

7. Name the active and passive members of each triumvirate, and sketch the history of the second one.

8. Write brief notes on the Gracchi, Mithridates, and Cato.

9. Draw a map of ancient Italia, marking by an asterisk, with name written near it, the following places: Ostia, Ticinus, Cannæ, Metaurus, Capua, Tarentum.

10. Give the boundaries of the Roman Empire in the time of Augustus.

No. 3.

1. What do you understand by Cavaliers and Roundheads? Explain the leading principles of the two parties.

2. Write brief notes on the Wars of the Roses, Wat Tyler's Rebellion, Act of Settlement, Titus Oates, and Cabal.

3. State concisely the causes which led to the granting of Magna Charta—Give its principal provisions.

4. Name in order of their accession the kings of the early Norman period, and enumerate the chief events in the reign of any one of them.

5. What is meant by the following:—Septennial Act, The Young Pretender, The Great Commoner, The Chartists, The Indian Mutiny.

6. Relate fully the circumstances which gave rise to the dispute between England and her American Colonies, and give a brief sketch of the war which followed.

7. State the claim of Henry V. to the throne of France. Was this claim a just one?

8. State the most important provisions of the following treaties:—Treaty of Bretigny, of Utrecht, of Versailles, of Washington.

9. Explain the nature of the reforms with which the names of Thomas Clarkson and Richard Cobden are respectively connected.

10. Explain the following terms:—Bill, Act, Parliament, Cabinet, Prime Minister.

Give 10 marks to each question.

No. 4.

1. What was the nature, and what was the extent of the Roman occupation of Great Britain?

2. Describe the process by which the Saxons and Normans were formed into the English nation.

3. State and criticise the right of Edward I. to the throne of Scotland.

4. What was the origin of the Wars of the Roses? Name the principal battles fought during the war, and the commanders on each side. Give the name and date of the final battle.

5. Name in order the sovereigns of the House of Tudor, giving the date of the accession of each.

6. What checks on the power of the Crown existed before the accession of the House of Tudor, and what have been established since?

7. State briefly the remote and immediate causes of the war between Charles I. and his Parliament.

8. Describe the causes, history, and issue of the Trial of the Seven Bishops.

9. When and on what terms were Scotland and Ireland united with England?

10. State briefly the circumstances which led to the Confederation of the North American Provinces. Name the principal statesmen who took a leading part in it, and give a few of the more important provisions of the Confederation Act.

No. 5.

1. Define the following:—*Witan*, *Thane*, *Weregild*, *Danegeld*, *Ceorl*, and *Villein*.

2. In what respects is Wat Tyler's insurrection of political importance?

4. Write a brief account of the war with France during the reign of Henry V.

5. Give a sketch of the risings in 1715 and 1745. Who were the principal Scotish noblemen concerned in them?

6. By whom were the battles of Plassy, the Nile, and Salamanca fought, and state the result of each of these battles?

7. How was Hanover united with the British Crown, and why was that union dissolved?

8. Name the principal statesmen and men of letters in the reign of Queen Elizabeth, of Queen Anne, and of Queen Victoria.

9. Arrange in chronological order and give the dates of the battles of Agincourt, Waterloo, and Naseby; the deaths of Elizabeth, George III, and Hampden; the parliamentary union of England and Scotland, the defeat of the Spanish Armada, the acquisition of Gibraltar, the passing of the first Reform Bill, and of the Habeas Corpus Act.

10. What is meant by the following:—*Roman Catholic Emancipation*, *Free Trade*, *Anti Corn Law League*; *the Chartists*, and *Alabama Claims*?

No. 6.

1. "She placed her foot upon a triple throne, and on the scaffold now she stands—beside the block—*alone*."

Explain the historical allusions in this passage.

2. A great revolution took place in the manners of the people, and in the literature of England after the Restoration. Explain the nature of this revolution and account for it.

3. Explain the right of William III. to the throne of England. Distinguish between the Petition of Rights. the Declaration of Rights, and the Bill of Rights.

4. What different parts of the continent of Europe, other than those now held, have belonged to England at different times since 1066? What has been the general effect of continental possessions upon British prosperity?

5. Give a brief sketch of Hannibal's march from Spain to Cannae. Note the physical difficulties which he overcame, the battles which he fought, and name the defeated Roman commanders.

6. Explain the nature of the reforms with which the names of the Gracchi are associated.

7. Write notes upon the following :— Marius, Mithridates, Catiline, Cicero, Cleopatra.

8. What is meant by the *Family Compact*, and of the *Secularization of the Clergy Reserves ?*

9. Specify the most important provisions of the Ashburton Treaty, of the Reciprocity Treaty, and of the Washington Treaty.

10. When did *Confederation* take place ? What provinces formed the Dominion then, and what have been added since ? How did the Dominion acquire the North West Territories ?

No. 7.

1. Explain the following terms : Heptarchy, Bretwalda, Thane, Danelagh, Curfew, Witan.

2. Give a brief account of the state of Britain at the time of its invasion by the Romans.

3. What German tribes took possession of the country and from what part of Europe did they come ?

4. State the most important events in the reign of Alfred and tell why his reign is regarded of so much importance.

5. How were the kings selected before the Norman Invasion ? What claims had William Duke of Normandy to the throne ?

6. Give a short account of the conquest of England by William Duke of Normandy.

7. What events correspond to the following dates: 596, 787, 878, 1002, 1017, 1066, 1164, 1206?

8. Explain the Feudal System. What was William's object in allotting the land in England to his nobles as he did?

9. Trace the descent of George I., and of the old Pretender from James I.

10. Arrange in chronological order, and give the dates of as many as you can of the following: the battles of Poictiers, Bannockburn, Waterloo, Blenheim, Flodden, the discovery of America, the death of General Wolfe, the accession of the House of Hanover, the peace of Utrecht, and the Declaration of Independence of the United States.

No. 8.

1. (*a*) Give a brief sketch of the life of Hannibal

   (*b*) Name the chief battles fought between him and the Romans, and state clearly where each battle field is situated.

2. (*a*) State the conditions of the treaty which brought the second Punic War to an end.

   (*b*) What were the reasons for Rome destroying Carthage?

3. In what reign were English possessions on the Continent most widely extended? Sketch briefly how these were acquired.

4. Why was Edward I. so popular? Give a brief account of the condition of England during his time.

5. Explain the origin of the Wars of the Roses. Which party ultimately triumphed and where?

6. Explain briefly the following terms; Regicides, Pilgrim Fathers, Cavaliers, Cabal.

7. What important consequences followed the battles of Senlac (Hastings) and Waterloo? State some of the chief

differences between the weapons used at Senlac and those in use at Waterloo.

8. State the terms of union between Great Britain and Ireland. Who was Prime Minister of England at the time of the union?

9. Give a brief account of the discovery and settlement of Canada by the French.

10. Arrange in chronological order and state who was king at the time of the following:—Summoning of First Parliament, discovery of America, Battle of Blenheim, union of parliaments of England and Scotland, abolition of Slavery, capture of Gibraltar, battle of Trafalgar, destruction of the Spanish Armada, trial of the Seven Bishops, Massacre of Cawnpore.

No. 9.

1. (*a*) Sketch the life of Marius.

   (*b*) Write brief notes on the following:—Gladiators, Catiline, Proscription.

2. Give a brief history of the First Triumvirate, introducing dates where you can.

3. The life of William the Conquerer has been described as "one long mastering of difficulty after difficulty." Illustrate this statement by giving a brief sketch of the difficulties he overcame.

4. State clearly the claims of Edward III. to the throne of France. What were the most important battles fought during the resulting war, and state the result of each (1) in France, (2) in England?

5. Account for the general discontent and popular insurrections during the reign of Henry VI.

6. Explain what is meant by the "balance of power."

Show how England first became important in Europe by holding it.

7. What were the objects of the insurrections of Wat Tyler and Wyatt? Sketch briefly the result of these insurrections.

8. Who first took the title of "King of Great Britain?" State clearly his claims to the throne of England.

9. Give a short account of the exploration and settlement of America (1) by the French, (2) by the English.

10. Explain the following:—School Lands, Secularization of Clergy Reserves, British North America Act, and Syndicate.

JULY EXAMINATIONS, 1880.

SECOND CLASS TEACHERS AND INTERMEDIATE.

FRENCH.

Time—Three hours. *Examiner*—S. Arthur Marling, M.A.

E.—De Fivas: Entroduction.

Translate:

Une aventure heureuse vint accroître son petit trésor. Il trouva un jour un cachet d'or armorié. Il le fait annoncer au prône: un Anglais se présente, et le réclame. S'il est à vous, dit Valentin, je vous prie de le blasonner. Tu te moques de moi, répond l'Anglais étonné; le blason n'est pas assurément de ton ressort. Soit, répond le jeune pâtre; mais, je vous déclare qu' à moins de blasonner votre cachet vous ne l'aurez pas. Surpris de ce ton ferme, l'Anglais obéit, et reçut ensuite son cachet. Voulant récompenser celui qui le lui avait rendu, il l'invita à le venir voir. Par sa générosité, la bibliothèque de Valentin s'éleva à quatre cents volumes, tandis que sa garde-robe restait toujours la même. Un sarrau de toile ou de laine, un mauvais bonnet et des sabots composaient tout son ajustement; mais c'était là la moindre de ses inquiétudes.

1. Give the indic. pres. throughout. of "accroître," "reçut."

2. "Blasonner." Explain the meaning.

3. Parse *surpris, obéit.*

4. "Cents." When does *cent* take, and when does it not take, the form of the plural?

French.—*Continued.*

EE.—Soubestre: Un philosophe sous les toits.

(a) Translate:

Une des singularités de Paris est de réunir vingt populations complétement différentes de mœurs et de caractère. A côté des bohémiens du commerce et de l'art, qui traversent successivement tous les degrés de la fortune ou du caprice, vit une paisible tribu de rentiers et de travailleurs établis, dont l'existence ressemble au cadran d'une horloge sur laquelle la même aiguille ramène successivement les mêmes heures. Si aucune autre ville n'offre des vies plus éclatantes, plus agitées, aucune autre ne peut en offrir de plus obscures et de plus calmes. Il en est des grandes cités comme de la mer: l'orage ne trouble que la surface; en descendant jusqu'au fond, vous trouvez une région inaccessible au mouvement et au bruit.

1. "bohémiens." Explain this term.

2. Parse *vit*, giving the principal parts.

3. "éclatantes." When does the present participle agree with its noun?

(b) Translate:

Chaufour, que je me disais en riant tout bas, après l'épée le marteau, après le marteau le balai; tu dégringoles, mon vieux, mais tu sers toujours ta patrie.

Cependant, vous avez fini par quitter votre nouvelle profession? ai-je repris.

Pour cause de réforme, voisin; les balayeurs ont rarement le pied sec, et l'humidité a fini par raviver les blessures de ma bonne jambe. Je ne pouvais plus suivre l'escouade; il a fallu déposer les armes. Voilà deux mois que j'ai cessé de travailler à *l'assainissement de Paris*.

French.—*Continued.*

1. Explain the meaning of the first sentence.
2. Give an account of the speaker.
3. Quote expressions used by him indicative of his profession.
4. *Tout.* When does this adverb change its form?
5. *Assainissement.* Give the derivation.

(c) Translate :

J'ai dédaigné les paroles qui n'avaient d'autre grace que leur sincérité ; j'ai cessé d'aimer les hommes, seulement parce que c'étaient des hommes, je les ai aimés pour leur supériorité ; j'ai resserré le monde dans les étroites limites d'un panthéon, et ma sympathie n'a pu être éveilléeque par l'admiration. Cette foule vulgaire que j'aurais dû suivre d'un œil ami, puisqu'elle est composée de frères en espérances et en douleurs, je l'ai laissée passer avec indifférence, comme un troupeau. Je m'indigne de voir celui qu'enivre son or mépriser l'homme pauvre des biens terrestres, et moi, vain de ma science futile, je méprise le pauvre d'esprit. J'insulte à l'indigence de la pensée comme d'autres à celle de l'habit ; je m'enorgueillis d'un don et je me fais une arme offensive d'un bonheur !

1. Give a summary of this chapter.
2. *j'ai reserré* to *panthéon.* Explain the meaning.
3. *enivre.* What is the subject?
4. *mépriser.* Explain the construction.
5. *j'insulte à l'indigence.* Write a list of verbs followed by *à.*
6. Explain the phrases "à la dérobée," "me voici de retour," "à partir de cette journée," "il s'agit de se conduire comme un homme."