

ANNUAL REPORT
OF THE
CORPORATION
OF
LAND SURVEYORS
OF THE
PROVINCE OF QUEBEC
AND
PROGRAMME OF EXAMINATION QUESTIONS
APRIL and JULY 1889.

QUEBEC
PRINTED BY C. DARVEAU
80 and 84, Mountain Hill.

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QUEBEC JULY, 1889.

To the members of the Corporation of Land Surveyors of the

Province of Quebec.

On the third of January last, at the request of ten members of the Corporation, according to law, the President called a special general meeting to be held on the 22nd of the same month. The object of the meeting was to consider certain amendments proposed to be made to chapter V of the revised statutes of the Province of Quebec, which had been prepared at a preceding meeting of the board of management.

The general meeting was held on the day appointed and thirty three members of the Corporation were present. Several alterations to the law were discussed and a bill was drafted to be submitted to the Legislature. The most important features of the Act, as subsequently sanctioned by Parliament, were, the exemption granted to the members of the corporation from attending as jurors before the Courts of Justice. But it must be remembered that this privilege is extended only to such members as comply with the by-laws of the Corporation, that is those members who have their names on the annual roll. Another feature of the Act as amended is the change of date for the annual general meeting, which hereafter will be held in the second week of April. Another clause defines the professional powers of a Land Surveyor and an amendment also regulates the disposal of papers and plans belonging to deceased Surveyors, or Surveyors having left the Province.

It was in compliance with the requirements of the act passed at this last session of Parliament that the annual general meeting of the members of the Corporation and the meeting of the board of Management were held in April last, and are to be held henceforth at the same date.

All the several amendments that had been made to the law, relating to Surveys and Land Surveyors since their incorporation in 1882, having been revised

and compiled in chapter V of the Revised Statutes of the Province of Quebec in 1888, it was thought necessary that the members should have a copy of this Revised Statute.

Therefore the Act as revised, including the amendments passed at the last Session, has been printed in french and english and a copy has been addressed to every member of the Corporation, with a copy of the projected by-laws, and also a copy of the tariff, as corrected and sanctioned at the last general annual meeting of April, 1889.

Annual Session of the Board of Management.

Examinations of April 1889.

At the session of the Board of Management held in April last, as provided by law, two candidates came forward to be examined for admission to study, and five candidates had given notice that they would present themselves to be admitted to practice: of these last four held diplomas as Civil Engineers and one had a diploma as a Dominion Land Surveyor.

However only one could be admitted for examination, the certificates furnished by the others not being sufficiently complete to satisfy the Board of Management that they had served during the period required by law.

The two candidates for study not feeling themselves sufficiently informed on some points of the programme retired before the end of the examination, and the only candidate who underwent his examination for practice, having failed on one of the most important subjects, had to withdraw.

Special Session of the Board of Management

Examinations of July 1889.

On account of the students who were indentured in July of the preceding years and who had been prevented from presenting themselves at the last April session for want of sufficient time to give thirty days notice required by law after the bill was passed by Parliament; the board of management decided, at the session of April last, that for this year, at least, a Special Session should be held in July; and with this intent a circular was addressed to all the students who were in a position to avail themselves of this special examination.

Therefore a special meeting of the board of management was called for the second day of July last, and sixteen students gave notice that they would be candidates at this examination. However, of the number, two did not make appearance on the opening of the session, five students were then inscribed to be examined for admission to study, and nine candidates were before the board to be examined for admission to practice, and of these last four had diplomas as Civil Engineers and one was a Dominion Land Surveyor.

Several of these candidates retired during the examinations having requested as a special favour that they should be informed so soon as they had failed on any one of those subjects, in which it was indispensable that they should retain at least a minimum of points.

The result was that one student Mr. P. F. Genest, of Quebec, was admitted to study the profession and one candidate Mr. Geo. K. Addie, of Sherbrooke, was successful through his examination in a satisfactory manner and was awarded a diploma as a Dominion Land Surveyor.

The location of the offices of the Corporation.

As was anticipated in our last report, we had to give up the only room which was left at our disposal which we occupied on the second floor in the Department of the Crown Lands. However by a special favour of the honorable Commissioner of Public Works, we were given on the fifth flat of the departmental building another room which is at present occupied for the office of the board during the session of the will of the government. In addition to this, owing to the large hall intended for the museum of the department of Public Instruction being unfinished and then unoccupied, we were allowed to occupy that hall for the examinations. A Privilege which was the more valued because the number of candidates was unprecedented and the hall was in the immediate neighbourhood of the office of the board of management permitting of all the necessary space for the convenient isolation of the candidates.

We cannot help however observing that the room presently occupied for the office being intended for the guardian of the museum, it may not be in our possession for a very long period; but it is to be hoped that the Ministers will set apart in some part of the unfinished portion of the departmental buildings proper apartments for the offices of the Corporation and a suitable room for the examinations.



Annual Contribution.

When comparing the last statement of receipts with the same statement for preceding twelve months, remembering that the statement above referred to includes only nine months, it is evident by the increasing amount collected for contribution up to the 31st March last, that not only do the members begin to realize the necessity of paying their contribution with punctuality each year, but that many of those, who are in arrears, understand that it is useless to endeavor any longer to avoid the payment of contributions due for former years.

It is very true that in certain districts recourse was had to judicial measures to hasten the collection of arrears; but most of those who were threatened with law suits remitted the amount due before the action was entered into court, in other cases, before the law suit was too far advanced.

We have to state that in accordance with the instructions received from the Board of Management we will have, in some other districts, to sue certain members, instead of neglecting to comply with the by-laws in this respect, should be, considering their social position, the foremost to uphold the honor and promote the interests of the profession.

By-Laws.

The draft of our by-laws which had been prepared some time previously by the Board of Management, was laid before the members at the last general meeting for their consideration. However some further amendments being suggested, it was decided the draft should be distributed generally to all the members of the Corporation for their further study. It may be expected therefore that the new set of by-laws will be finally adopted and sanctioned at the next general meeting in April.

Roll of Members.

The printing of the roll of members will not be delayed as it has been in former years, and it is proposed to have it prepared early in November, so that it may be handed to the printers by the middle of December. The annual contribution for 1889, should then be paid by the 1st of November, and those who have complied with the by-laws by that date, cannot expect that their names will be on the roll for 1890.

It may be proper here to remark that according to Article 4127 of the Statute as amended at the last Session, a Surveyor cannot in any way act as such, if his name is not entered on the official roll of members for the current year; and consequently all the Acts of a Surveyor who acts under such circumstances are absolutely null and void.

It is then important that the Public should not suffer by the Acts of Surveyors operating contrary to law when Surveying, dividing lands, laying boundary marks or performing any other of their professional callings, which therefore must not bear the least character of validity.

Every possible means will be taken to spread the knowledge of this article of the Act, and moreover in order that no other Surveyors may be employed than those who are legally authorised to act according to law, the roll will be published henceforward in a prominent place in all the postoffices of the Province.

GENERAL STATEMENT OF THE FINANCES OF THE CORPORATION.

(From 1st July 1888 to 31 March 1889.)

The general statement of the finances for the nine months extending from the general meeting in July 1888 to the 31st March 1889, shows that the financial condition of the Corporation is satisfactory.

The receipts have reached the sum of..... \$116

And the expenses have been kept within the sum of..... 71

leaving a surplus of..... \$44

Adding to this surplus the balance on hand, the 31st March 1888.. \$132

We have a total surplus of..... \$176

Which is the amount to the credit of our bank account on the 31st March

Further details relating to this statement may be found in Appendix A.

The general annual meeting of the members of the Corporation being held in the second week of April, according to the act passed at the last session of Parliament, the last financial statement had to be limited to the nine months expired on the 31st March last, and in future the fiscal year for the Corporation Land Surveyors will extend from the 1st April to the 31st March, so that the balance may be balanced in time for the general meeting.

The whole respectfully submitted,

ANT. PAINCHAUD, President.

C.-E.-GAUVIN, Secretary-Treasurer

(APPEN-
CORPORATION OF LAND SURVEYORS
General Statement of Receipts and Expendi-

RECEIPTS.	\$	cts.	\$	cts.	\$	cts.
Balance on the 30th June 1888.....					1324	61
Amount received for contribution for the year ended 1st November 1888.....	508	00				
Amount received in advance for contribution for the year 1889.....	16	00				
Amount received for former contribution	311	00				
Total received for contributions..			835	00		
Fees paid by candidates at the examinations of July 1888.....	300	00				
Fees paid for registering of diplomas...	20	00				
Fees paid for certificate admitting to study.....	4	00				
Fees paid for certificates after the publishing of the roll of members.....	3	00				
Total received for fees.....			327	00		
Total amount received for the nine months ended on the 31st March 1889					1162	00
Total....					<u>2486</u>	<u>61</u>

A. PAINCHAUD,

President.

Québec, 31th March 1889.

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ture for the nine months ending on the 31st March 1889.

EXPENDITURE	\$	cts.	\$	cts.	\$	cts.
Fees paid to the President for 9 months.	150	00				
Fees paid to the Secretary for 9 months.	75	00				
Amount paid to Solicitor.....	17	00				
Total paid to the officers			242	00		
Fees paid to the Examiners for the examination of July 1888.....	198	00				
Fees paid to members of the board attending the session of July 1888.....	102	00				
Amount paid to members of the board for travelling expenses.....	44	95				
Total paid to members of the board			344	95		
Disbursements for printing.....	95	40				
“ for post stamps.....	20	00				
“ for office expenses.....	17	04				
Total paid for administration.....			132	44		
Total of expenditure for the nine months expired 31st March 1889.....					719	39
Cash deposite in saving's bank 31st March 1889.....					1767	22
					<u>\$2486</u>	<u>61</u>

C.-E.-GAUVIN,

Secretary-Treasurer.

STUDY.

Questions submitted to candidates who were before the board to be admitted to study the profession.

ARITHMETIC.

- 1° Two fractions are given, as follows:

$$\frac{4}{7} + \frac{1}{18} \text{ and } \frac{2}{3} + \frac{1}{11}$$

Which is the greater?

If you multiply $\frac{4}{7}$ by $\frac{1}{18}$ and $\frac{2}{3}$ by $\frac{1}{11}$, which of the results is the greater?

- 2° If 35 $\frac{3}{4}$ yds of cloth cost \$68.70 $\frac{1}{10}$ what will 7 $\frac{3}{4}$ yds cost and what will be the price per yard?

- 3° Perform the operations indicated in the following expressions and simplify them.

$$\frac{(\frac{2}{3} \text{ of } \frac{4}{7}) (4\frac{2}{3} + 1\frac{1}{2})}{(3\frac{1}{4} - 2\frac{3}{8}) (1\frac{3}{4} \text{ of } 4\frac{3}{4})}$$

- 4° Give the square root of 591.4624.

- 5° I bought 40 gls. wine at \$1.05.

30	"	"	1.15.
25	"	"	1.50.
15	"	"	2.00.

The casks cost \$5.67 and the freight amounted to \$8.00.

Having mixed these wines together, I intend to sell them at a net profit of per cent, what should be the price of sale per gallon?

- 6° Perform the following operation $3.2968 \times 2.732 \div 17.9$.

- 7° $\sqrt[3]{10.941048}$.

8° A farmer bought from A a piece of land for which he paid \$60.00 an acre. He also bought from B the same quantity of land for which he paid \$85.00 an acre. The whole cost amounted to \$53,215.00. How many acres of land did he buy from A and from B?

- 9° Divide 80° 21' 13" in three parts proportional to the following numbers 2—5.3—8.5.

- 10° Reduce: $(\frac{2}{3} \text{ of } \frac{2}{3}) (\frac{2\frac{1}{2} + 3\frac{1}{2}}{1\frac{1}{2} - \frac{1}{2}}) \div (4\frac{2}{3} - \frac{1}{3} \text{ of } \frac{2}{3})$

- 11° What will $5\frac{1}{2}$ yds of cloth cost at $\$7.07\frac{7}{8}$ per yard?
 12° Reduce $\frac{7}{8}$ to a fraction having for its numerator 47.
 13° Divide 584 by 0.00584.
 14° Give the square root of 0.0000047089.
 15° What is the cube root of 99252847?

ALGEBRA.

1° $a \times a^m, a^m \div a^m, a^m \div a^{-m}, a^2 \div a^{-\frac{1}{2}}$.

2° It is proposed to reduce the following expression to a single fraction and to calculate the value of x , to two decimal places.

$$x = \frac{15 + \sqrt{10}}{15 - \sqrt{10}} + \frac{30 - \sqrt{10}}{15 + \sqrt{10}}$$

3° $-a (4a + b^2 + \{ 3a^2 - b[+b - c] - a \times b \} + c^2 - d)a$.

4° The sum of two numbers is 100, the sum of the square of these numbers is 5018. Find the numbers.

5° Cube and simplify $\frac{a}{b} \sqrt{b^c}$

6° Divide $c^{-2} \sqrt{ab}$ by $c^{-3} \sqrt[3]{ac}$

7° Divide $32x^5 + 243$ by $2x + 3$.

8. The sum of two numbers and their reciprocals is 63 and 2.05. Find the two numbers.

9° Simplify $\sqrt[4]{a^3 \sqrt{b^3}}$

10° $a^m b^m \times a^{-m} b^n$

11° $-a (b + c [-a + d] \{ a + b - c \})$.

LOGARITHMS.

1° Calculate by logarithms the following expression.

$$\frac{31.071 \times 21.372 \times 7.259}{0.515 \times 0.319 \times 0.021}$$

2° Calculate $\sqrt[3]{\frac{7a}{13}} \sqrt[4]{a^7 \times a^{-5}} \quad a = 36844$.

3° Calculate by logarithms $\frac{11}{12} \div \frac{1}{12}$.

4° Find out the logarithm of $3\frac{1}{12}$.

5° Multiply $\log = 0.54$ by 0.54 .

$$6^\circ \sqrt{\frac{12.425 \times 0.79225}{0.000126}}$$

7° Find out the value of

$$\sqrt{\frac{\frac{a^3 \times 4 a^7}{3 a a^2}}{\frac{2}{2} \div \frac{4}{4}}} \quad a = 2422$$

8° Find the vulgar fraction represented by $\log. -0.2041199$.

PLANE GEOMETRY.

1° What is the measure of an angle having its summit in the interior of the circumference of a circle.—Demonstrate.

2° Demonstrate that two triangles are similar when the three sides are perpendicular to the corresponding sides.

3° Demonstrate that the surfaces of similar triangles are proportionate to square of their homologous sides.

4° In what ratio do two chords in a circle cut one another.—Demonstrate.

5. Demonstrate that two chords in the same circle, equally distant from the center, are equal one to the other.

6° Prove that any side of a triangle being produced, the exterior angle is equal to the sum of the two interior and opposite angles of the triangle.

That the sum of the three angles of a triangle is equal to two right angles.

That the sum of the interior angles of any rectilinear figure is equal to as many right angles, less two, as the number of sides forming the figure.

7° From a point on one of the sides of a triangle draw a straight line to bisect the triangle.

8° From a point on or outside of the circumference of a circle draw a straight line tangent to the circumference.

9° Prove that the angle at the center of a circle is double of the angle at the circumference having the same base.

10. In two triangles if the angle of one is equal to an angle of the other, and

if the adjacent sides of these angles are proportional; the two triangles are equiangular, and the angles opposite the homologous sides are equal. Demonstrate.

HISTORY OF CANADA.

- 1° Give a biographical outline of Bishop Plessis.
- 2° Describe the government of Carleton. First and second administration.
- 3° Expedition of Champlain against the Iroquois in 1609 and 1610.
- 4° Quebec under the Kirtks.

GEOGRAPHY.

- 1° What are the principal mountains of the Province of Quebec?
- 2° What are the chief cities of the several Provinces of the Dominion? Give their names and their location.
- 3° What are the chief rivers of France and Spain?
- 4° Where are the following cities located: Cherburg, Petersburg, Tobolsk, Damascus, Charleston, Limerick, Copenhagen, Shanghai, and Rio-Janerio?

PRACTICE.

Questions submitted to the students who were before the board to be admitted to practice.

ARITHMETIC.

1° Four different qualities of wine have been mixed together. They were bought at the following prices: The first for three shillings per gallon; the second for five shillings; the third for six shillings; and the fourth for eight shillings. In the mixture the quantity of the first and last was double the quantity of the other qualities. What is the cost of the mixture per gallon?

2° A canal has been divided in three equal parts. $\frac{2}{3}$ of one of the sections has cost \$71.50, and the whole section was constructed by 7 men in $3\frac{1}{2}$ days, at the rate of 65 cts per linear yard. What is the total length of the canal, and under equal circumstances, in what length of time will ten men complete the whole works?

3° State in hours and fractions of an hour the sum of $\frac{1}{2}$ of 3 hours, and $\frac{1}{4}$ of 12 minutes.

4° Reduce to a vulgar fraction in its lowest terms 0.00538.

5° What is the value of 1.112 as a vulgar fraction?

6° A carrier has removed 72 tons of goods to a distance of 14 miles for the price of \$141.13. What did the carriage cost per ton?

ALGEBRA.

1° Find the greatest common divisor of $3x^5 - 50x^3 + 15x + 8$, and also of $x^5 - 2x^4 - 6x^3 + 4x^2 + 13x + 6$.

2° Solve the following:

$$(x + 1)^2 = \{ 6 - (1 - x) \} x - 2.$$

3° The difference between the squares of two consecutive numbers is 15. What are the two numbers?

4° Solve the following:

$$\sqrt[3]{(-a^3)}; \quad \sqrt[3]{\frac{a^3}{b^3}}; \quad \sqrt[3]{\left(\frac{-a^3}{b^3}\right)}$$

$$5^\circ \quad \frac{x}{2} + \frac{2}{x} = \frac{x}{3} + \frac{3}{x}.$$

6° If $4x^2 + 7y^2 = 148$; and if $3x^2 - y^2 = 11$. What is the value of x and y ?

GEOMETRY.

1° Prove that the lines drawn from the bisection of each of the sides of a triangle to the opposite angles will intersect at the same point.

2° How do you express as a function of the radius in a circumscribed circle, the side of an octagon?

3° Demonstrate that the lines which bisect the supplements of the two angles of a triangle and also the third angle of the same triangle, meet in the same point.

4° Prove that in every trapezium, the triangle having for a base one of its nonparallel sides, and for a summit the center of the opposite side, has its surface equal to the half of the surface of the trapezium.

5° In a circle, a chord of 12 feet is divided by a diameter into two parts, the one being nine feet greater than the other. What is the diameter.

SURFACES AND VOLUMES.

1° A pyramid is 30 feet in height, and its base is in the form of a hexagon the sides of which are 12 feet. Calculate the volume of the pyramid.

2° The surface of a circle minus the surface of the equilateral triangle inscribed therein, is equal to 2948.14 feet. What is the surface of the circle, and the surface of the triangle?

3° A vase of conical form, having a base of 8 inches in diameter, is filled with water to the height of 10 inches, whereat the surface of the liquid has a diameter of 12 inches. By dipping the whole of a piece of metal into the water it rises 2 inches. What is the volume of the piece of metal?

4° The sides of three regular octagons are respectively 3, 4 and 12. What will be the side of a fourth octagon equal in value to the sum of the three first?

5° A cylinder 10 inches in diameter runs through the centre of a sphere of 40 inches in diameter. What is the remaining surface of the sphere?

6° State in acres and fractions of an acre the surface of a piece of land in the shape of an equilateral triangle, the radius of the inscribed circle being 140 english feet.

7° A field, of elliptical figure has a surface of 1 acre, 1 rood $20\frac{1}{10}$ perches and its greatest diameter is 5 chs. 36 lks. What is the length of the smaller diameter in chains?

8° A spherical ball, four feet in diameter, is exactly contained in a vase with hexagonal bases. All the interior faces of the vase being tangent to the ball what is the cubical contents of the vase?

9° A stack of hay in the shape of a cone is 30 feet in height and contains 5 tons of hay. At what distance from its summit should you begin to cut off two tons?

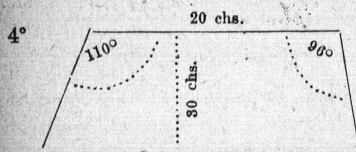
10° A melting-pot in the form of a truncated cone is 10 inches in height, 4 inches in diameter at the bottom and 7 inches in diameter at the top. It contains a melted metal the upper surface of which is 6 inches in diameter. What should be the radius of a spherical mould required to contain the whole of the metal?

PLANE TRIGONOMETRY.

1° The three sides of a triangle are respectively 75, 100, 125. Find the angles.

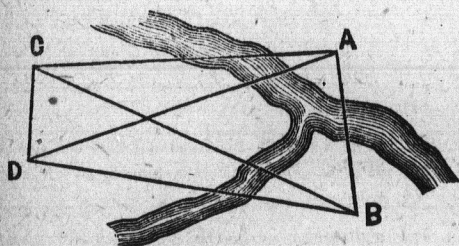
2° In a regular pentagon the sides are 60 feet each; find the length of the lines drawn from one summit to the others and dividing the pentagon in triangles.

3° In a rectangular triangle the difference between the base and the hypotenuse is 169.9 yards; and the angle at the base is $42^{\circ} 36' 12''$; what is the length of the perpendicular?



4° A field is laid out in the form of a trapezium; one of the parallel sides is 20 chains and the adjacent angles are respectively 110° and 96° . The height between the parallel bases is 30 chains. Find the three unknown sides of the trapezium.

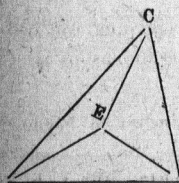
5° Find the angle formed by the two diagonal lines of a rectangle, two of the sides being 30 and 8.



6° Required the distance between two inaccessible points A and B.

The base $CD=300$ yards. At C the angle $BCD=58^{\circ} 20'$, and the angle $ACD=95^{\circ} 20'$. At D the angle $CDA=53^{\circ} 20'$ and the angle CDB

$=98^{\circ} 45'$.—What is the distance from A to B?



7° In a field of triangular form, the length of the sides are as follows:

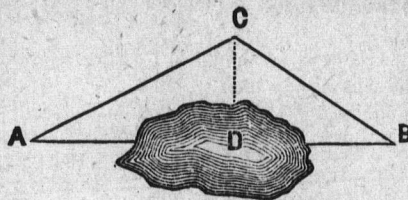
$AB = 50$ perches.

$AC = 46$ do.

$BC = 40$ do.

You are requested to mark on the ground the point E, equally distant from the points A.B.C. State the distance from each of these points to the point E, and the angle required at A to define the direction of the point E.

8° A circle has a radius of 60 feet and is inscribed in an equilateral triangle; find the length of the line that joins the summits of the triangle to the center of the circle.



9° A point A is visible but inaccessible from B. I locate a third point C and measure $AC = 12$ chains. And $CB = 18$ chains, the angle ACB being found equal to 163° , what is the length of CD perpendicular to AB ?

SPHERICAL TRIGONOMETRY.

1° What is a spherical triangle?

What is a spherical angle?

What is the greatest limit for the sum of the angles in a spherical triangle?

What is the smallest limit for the sum of the angles in a spherical triangle?

What do you mean by spherical excess?

2° How many parts must be known in a spherical triangle, to find out the other parts?

3° In a spherical triangle the side $b = 120^\circ 30' 30''$, the side $c = 70^\circ 20' 15''$ and the angle $A = 50^\circ 10' 15''$. Find the angle B .

4° In a spherical triangle the angle $C = 90^\circ$, the side $c = 110^\circ 46' 20''$ and the angle $A = 80^\circ 10' 30''$. Find the side B .

5° From what cause is there ambiguity in the solution of a spherical triangle?

ANALYTICAL TRIGONOMETRY (Plane).

1° What are the signs of the sines, cosines; tangents, cotangents; secants cosecants, for all values of an angle from 0° to 360° ?

2° Prove that $\tan x = \frac{\sqrt{1 - \cos^2 x}}{\cos x}$

3° Express in functions of radius 1, $\sin. 45^\circ$; $\cos. 30^\circ$; $\tan. 15^\circ$.

4° Prove that $\cos. (A - B) = \cos. A. \cos. B. + \sin. A. \sin. B.$

5° If $\sin. (A + B) = \sin. A. \cos. B. + \cos. A. \sin. B.$, and $\cos. (A + B) = \cos. A. \cos. B. - \sin. A. \sin. B.$; prove that $\tan. (A + B) = \frac{\tan. A. + \tan. B.}{1 - \tan. A. \tan. B.}$

6. Express $\sin. A$ as a function of $\tan. A$.

7. What is the equivalent of $\tan. 45^\circ \tan. 60^\circ$, $\sec. 60^\circ$? And demonstrate.

8. Express in functions of sine and cosine all the other trigonometrical lines.

ASTRONOMY.

1° On the 9th of August 1887 in latitude north $48^{\circ} 5' 15''$, the following observation was made to determine the azimuth of a line.

Direct obs.	} Sideral time of observation 15 hrs. 57m. 15s.
Circle on the right.	
	} Horizontal circle reading (H. C. R.) on Pole Star $17^{\circ} 974$.
	} " " " (") on line $207^{\circ} 184$.

Reversed obs.	} Sideral time of observation 16 hrs. 0m. 59s.
Circle on the left.	
	} H. C. R. on Pole Star $197^{\circ} 984$.
	} H. C. R. on line $27^{\circ} 184$.

The chronometer being 5m. 42.35s fast. What is the azimuth of the line?

2° The zenith distance (north) of a star passing the meridian is $19^{\circ} 22' 46''$, 3, and the declination of the star is south $11^{\circ} 47' 15''$, 3. What is the latitude of the place?

3° Draw a diagram and give the formula required to find: 1° The latitude by the passage of a star across the prime-vertical: 2° The azimuth by the pole star at its elongation.

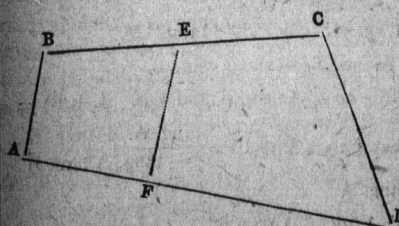
4° What do you mean by the "equation of time" and state the cause of it?

5° Find the right ascension and the declination of the sun the 20th of March at 2 o'clock 15m. P. M. in $71^{\circ} 15'$ west longitude.

6° When making an observation of the pole star to determine the azimuth by an altitude, why is it more accurate to take the star at its elongation rather than when crossing the meridian? Should the time of observation be known exactly, would there be any reason to prefer the elongation of the star to its crossing the meridian in making your observation.

7° In latitude $46^{\circ} 23' 30''$ the corrected altitude of the center of the sun is $26^{\circ} 29' 30''$, and the declination $23^{\circ} 12' 45''$ north. What is the azimuth of the sun?

PRACTICAL SURVEYING.



1° AB True North = 12 chs.

BC. N $56\frac{1}{2}^{\circ}$ E = 20.78 chs.

CD. S. $33\frac{1}{2}^{\circ}$ E = 22.21 chs.

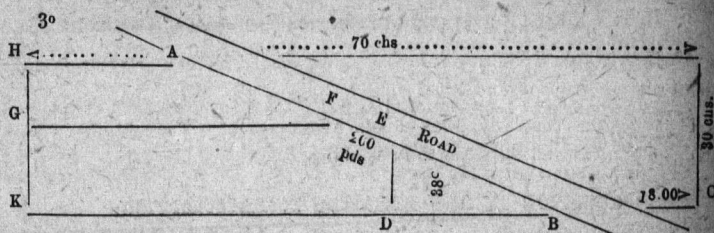
DA. S. $80\frac{1}{2}^{\circ}$ W = 30 chs.

It is required to divide the parcel of land AC in two parts by a line FE, so that ABEF may be proportionate to FECD as 3 to 5.

2° The magnetic declination is $14^{\circ} 27'$ West at 8 o'clock in the forenoon. At

2 in the afternoon the declination is supposed to have increased $17'$; state what it should be at 8 o'clock a. m.

- 1° The magnetical course of a line bearing N. $4^{\circ} 29'$ W mag. at 2 P. M.
- 2° The magnetical azimuth of a line bearing N. $14^{\circ} 20'$ E mag. at 2 P. M.
- 3° The magnetical azimuth of a line bearing S. $39^{\circ} 52'$ E. mag. at 2 P. M.
- 4° What should be the true azimuth of each of the above lines.



In Stanfold, P. Q., M. X. is owner of a parcel of land of rectangular form being 30 chs. in breadth and 70 chs. in length.

A public highway crosses the land.

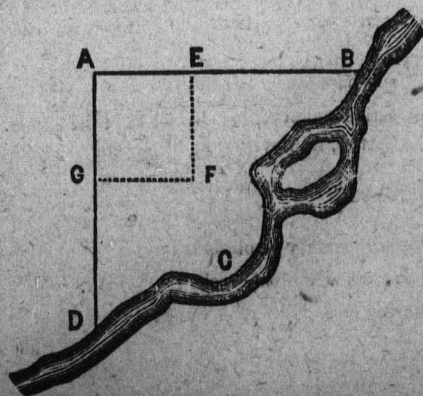
$BC = 18$ chs.

The angle $EBD = 38^{\circ}$.

M. X. has donated to the church wardens a portion BDE of his land of triangular form and containing 20 acres.

At the point F, 200 feet distant from E a straight line FG is drawn parallel to CK.

What is the superficies of AFGH?



4° In the lot of land ABCD rectangular at A, it is proposed to cut off a portion AEEF as to form a square containing 9 acres, 3 rods, and 28 perches.

Calculate the length of the Sides of the square.

QUESTIONS ON LAW RESPECTING SURVEYS

- 1° When a land Surveyor is requested to place boundary marks, what rules must he follow ?
- 2° What should a land Surveyor faithfully detail in a proces-verbal ? And what omission in the form may cause the original or the copy to be null and void ?
- 3° How is a Land Surveyor governed in the Survey of a Township ?
- 4° How is a land Surveyor to determine the limits of a property in a city without placing boundary marks of stone ?
- 5° When the boundary posts of lots in a range of a Township have disappeared, how is the land Surveyor to re-establish the original division ?

QUESTION ON LAW RELATING TO PRESCRIPTION

- 1° What must possession be for the purposes of prescription ?
- 2° Name some of the causes which may prevent prescription.
- 3° In general what immoveable properties are imprescriptible ?
- 4° What kind of prescription releases from all obligation ?

MINERALOGY

- 1° What is a chrystal ?
- 2° State the different systems relating to chrystals ?
- 3° What are chrystallographic axes ? State the law of Ronier de Lisle in connection with the variation of the angles of chrystals ?
- 4° What is refraction ? and what is meant by simple and double refraction ?
- 5° State the importance of cleavage as a specific character ? and give an illustration.
- 6° What is a scale of hardness ? and how is it made use of ?
- 7° Give the composition, the distinctive and principal characters of the following mineral species : Mica, feldspar, hematites, iron pyrites, and limonite.

GEOLOGY

- 1° How do you know rocks to be sedimentary or plutonic ?
- 2° What is the origin of metamorphic and plutonic rocks ?
- 3° What is the structure and bearing of metalliferous veins ?

4° What is meant by fossils ? and how is the study of geology facilitated by the existence of fossils ?

5° What is the cause and effect of erosion ?

6° State in few words what is the mechanical action of ice ?

7° What are the different geological eras ?

8° In what great geological division are classed the gneiss of the Laurentides and the arable soil of the province of Quebec ?

9° What is the origin of coals and petroleum ?

BOTANY

1° What is the use of foliage in a plant ?

2° What is the difference between cells, fibres and capillary vessels ?

3° Give a description of the structure of buds and bulbs.

4° Describe the three principal parts contained in the root.

5° Name the verticillus composing a flower from the circumference to the center.

6° What is the fruit and what are the principal parts forming the fruit ?

7° In how many parts is the stem divided as regards its structure ?

8° Give a definition of the seed, and in how many parts is it divided ?

9° How is the vertical and horizontal growth of the ordinary timber stems produced ?