

ANNUAL REPORT
OF THE
CORPORATION
OF THE
LAND SURVEYORS
OF THE
PROVINCE OF QUEBEC
AND
PROGRAMME OF THE EXAMINATIONS

APRIL AND OCTOBER 1890

LEVIS
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1891

*To the members
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the 31st March

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Quebec 31st march 1890.

To the members of the Corporation of Land Surveyors of the Province of Quebec

In compliance with the disposition of the law relative to our Corporation, I have the honour to report on the operations of the year ended the 31st March 1890.

Immediately after the general meeting held in April 1889, the act respecting land Surveying and the Survey of lands, including the latest amendments passed in virtue of 52 Vic. chap, XLI, was handed to the printers to be published in the same form as the revised statutes of the Province of Quebec.

The act was also translated into English; and being printed both into French and English a copy was addressed to each member of the Corporation.

At the last general annual meeting the tariff of fees to be paid to the members of the Corporation for their professional services, was amended and adopted. This tariff was also printed both in French and English and a copy addressed to each member.

As suggested by some members, the rough draught of the new by laws, with the alterations and amendments proposed thereto, has been distributed a second time amongst the members of the Corporation, in order that it might be more thoroughly studied in all its details. However

very few members suggested any amendments to be proposed to this last edition. Therefore you are called upon, at this meeting, to sanction these by-laws, and there is no doubt that they will render more effectual the administration of the Corporation.

Early in June last the Honourable Commissioner of Crown Lands was addressed by the Secretary Treasurer in relation to a resolution passed at the last general meeting, praying to have printed, for the use of Land Surveyors, a list of all the Townships, Seigneuries and Parishes in the Province of Quebec, with thereon stated the astronomical course and bearing of all the lines dividing the lots in such localities. The receipt of this letter was acknowledged in January last; and in a personal interview had since with the assistant Commissioner on the same subject, we have been able to ascertain that the Honourable Commissioner was not unfavourable to our demand, but he desired to procure from the officers of his departement further information as to the extent of such a work and the cost of printing such a list.

As it is most important for the Public that all documents relating to the boundary and to the division of immoveables, be carefully secured, it is the duty of the Corporation to see that all such documents as have been executed by members who are now deceased, or who have left the Province, are not lost or mislaid. Therefore a circular was addressed to the Prothonotaries of the different Districts of the Province calling their attention to the clauses of the law which defines their duties in relation to these documents of Land Surveyors: Praying also to have us informed if the *greffes* of certain members in particular had been deposited in their office. Feeling the responsibility incurred by them for neglect of duty in this respect, the prothonotaries replied that they would take immediate steps to recover these *greffes*.

It was ascertained that since 1882, when the Land Surveyors were incorporated, ten members have departed this life, and that the *greffes* of seven had been deposited according to law. Measures have been adopted by the prothonotaries to recover the three remaining. However in the case of members leaving the Province for a definite period only, or with the intention never to return, it is very difficult and even impossible to compel such members to comply with the law, when they have reached the other Provinces or the neighbouring states.

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It is therefore very possible that it will become necessary before long to amend the law in this respect. And the Corporation may be called upon to suggest better and more efficient means, not only to secure with more efficiency the documents and plans executed by Land Surveyors, but also to cause such documents to be made strictly in accordance with the dispositions of the law ; and the records to be kept in such a manner that a procès-verbal or a plan may be reached without difficulty or loss of time.

Two sessions of the Board of management have been held during the year, one in April and one in July. Several candidates made application to be examined during these two sessions. However only one student was successful in his examination to be admitted to study the profession, and only one candidate received a diploma to practice.

At the meeting of the Provincial Parliament at Quebec in January last, a bill relating to Surveys and Surveyors was presented in the lower house by Mr Lafontaine the member for Napierreville. Although short and apparently inoffensive, it had for its object to deprive the Land Surveyors of many of their privileges, and vest in the Civil Engineers rights that were not even enjoyed by the members of our Corporation in the performance of their professional duties.

It was therefore thought urgent, in the interest of the profession, to call immediately a general meeting of the members to adopt such measures as would prevent the bill of Mr Lafontaine becoming law.

The general meeting was held on the 28th of January and was attended by a large number of members, so great was the feeling on the subject. A number of resolutions were adopted, setting forth the acquired rights of the Lands Surveyors in the Province of Quebec, the protection they afforded to the public in the exercise of their profession, and the great responsibilities befalling them when dealing professionally with public and private property. Petitions were also signed and presented to the three branches of the Legislature, and a committee struck off, with power and instructions to adopt all proceedings that might be thought necessary to prevent such legislation.

The bill of Mr Lafontaine was referred to the committee of the House

on Legislation, and the Land Surveyors appeared with council before this committee to uphold the interest of the Corporation.

However right and justice were too apparently manifest in the claims of the Corporation to require a very lengthy discussion, and the committee was soon convinced that neither the public interest nor the welfare of the Civil Engineers needed, that such a measure should become law. Therefore the bill was erased from the orders of the House of Assembly.

The Secretary of the Association of Land Surveyors for the Dominion has forwarded to the Secretary of our board a proposed Scheme, submitted by J. S. Dennis, Esq., its president, for the affiliation of the different associations of Land Surveyors in the Dominion. The outlines of this affiliation are as follows: That one joint annual meeting of all the associations should be held instead of each association holding its own meeting as at present, and that the joint meeting be called *the annual convention of Canadian Land Surveyors*.

That the annual convention be held alternately at a point in the different Provinces most central for the members of the association of that Province.

That each association maintain its own individuality and the general affiliation would not interfere with its provincial constitution,

The annual convention would extend over two days; a certain portion of the first day to be allotted to each association for the transaction of its individual business. The second day to be spent in the reading of papers &c. The whole being ended by an annual dinner or some other social gathering.

This scheme with all its details as furnished by Mr Dennis, is submitted to your careful consideration, and you will be pleased to express your opinion on the advantages to be derived from such an annual convention, if the scheme was adopted.

The amount collected during the year ended on the 31st march 1890 has very nearly equaled the collections of former years. However the unexpected disbursements required to overthrow the bill of M. Lafontaine in the House of Assembly, added to the expenses of two sessions held in

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the same year, has considerably curtailed the balance remaining to our credit.

Adding to our cash balance on 31st march 1889	1767. 22
The collections for the year 1889-90	1215. 04
We have a total of.....	3082. 26
And deducting the expenses of 1889-90	2097. 59

We remain with a balance of..... \$ 984. 67
the amount to the credit of our bank account on the 31st march 1890.

All further details may be found in the general statement herewith as it shows the amounts derived from the different sources of revenue and all the amounts paid for the several departments of the administration.

There can be no doubt that if we pursue in the future the same economy in the expenses and the same earnestness in the collection as we have done in the past, we will ensure the stability of our Corporation and rank our Profession the equal of any of the other liberal profession in the Province.

Humbly submitted

ANT. PAINCHAUD

President.

Quebec 31st March 1890.

CORPORATION OF LAND SURVEYORS

General Statement of Receipts and Expenditures

	\$	cts	\$	cts	\$	cts.
RECEIPTS.						
Balance 31st march 1889.....					1767	22
Amount received for the contribution of 1889, and due on the 1st november 1889	568	00				
Amount received in advance for the contribution of 1890 and due on the 1st november 1890.....	8	00				
Amount received for arrears of contribution.....	341	60				
To al amount received for contributions.....			917	60		
Fees paid by candidates entered for the examinations of april 1889.....	65	00				
Fees paid by candidates entered for the examinations of july 1889	250	00				
Fees paid by candidates admitted for practice at the session of july 1889.....	20	00				
Fees paid by candidates admitted to study at the session of july 1889	4	00				
Fees collected for registering diplomas, at the session of july 1889.....	4	00				
Fees collected for certificates to practice after the annual roll had been printed	7	00				
Total amount of fees collected			350	00		
Collected for a copy of diploma.....			2	50		
Interest on deposits in the bank to 31st may 1889.....			44	94		
Total of receipts for the year ended on the 31st march 1890.					1315	04
					<u>\$3082</u>	<u>26</u>

Quebec, 31st march 1890.

Examined and verified
15st, april 1890.

J. Bte RICHARD }
Geo. ROY, } Auditors

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EXPENDITURES

OF THE PROVINCE OF QUEBEC

for the year ending the 31st march 1890.

\$	cts.		\$	cts	\$	cts	\$	cts
		EXPENDITURES.						
1767	22	Indemnity paid to the President for 12 months	400	00				
		id paid to the Secretary Treasurer for 12 months...	100	00				
		Amount paid to the attorney of the corporation for professional fees	38	73				
		Total amount paid amount paid to the officers.			538	73		
		Amount paid to attorneys in other districts for collecting the contribution	20	33				
		Amount paid for disbursements in courts	27	90				
		id paid for attorneys' fees for appearing before the Private bills committee. Re Bill Lafontaine	300	00				
		Total amount paid for legal disbursements.....			348	23		
		Fees paid to Examiners Session of april 1889.....	174	00				
		id paid to members of the board id 1889.....	204	00				
		Fees paid to Examiners Session of july 1889.....	227	00				
		id paid to members of the board id 1889.....	146	00				
		Total amount of fees paid for the sessions of the board...			751	00		
		Amount paid for travelling expenses to members of the board Sessions of april and july 1889.....		00	109	46		
		Printing Act respecting Surveyors, French and English....	34	00				
		id Blank forms for examinations.....	26	25				
		id Annual report and programme for 1889. Fr. and Engl	42	00				
		id Annual roll of members for 1890 Fr. and Engl	25	50				
		id Petitions and documents re Bill Lafontaine.....	33	45				
		id Circulars and other printed papers during the year	84	25				
		Total amount paid for printing			245	45		
		Amount paid for stamps.....	31	00				
		id paid for telegrams	2	92				
		id paid for stationery.....	36	42				
		id paid sundry office disbursements.....	74	38				
		Total amount paid for contingencies.....			104	72		
		Grand total of the expenditures.....					2097	59
		Balance as per Bank book 31st march 1890.....					984	67
							<u>\$3082</u>	<u>26</u>

\$3082 26

March 1890.

Québec, 31st march 1890

C. E. GAUVIN,
Sec.-Treasurer.

ANT. PAINCHAUD,
President

CANDIDATES ARE EXAMINED ON THE FOLLOWING SUBJECTS

FOR ADMISSION TO STUDY.

<i>Subjects.</i>	<i>Authors recommended</i>	<i>Number of points to be retained</i>
Dictation.....		75 on 100
French and English Translation.....		60 on 100
Canadian History	Miles, Laverdiere.....	50 on 100
Geography	Lovell's Larger, Holmes.....	50 on 100
Arithmetic	Christian Brothers.....	60 on 100
Geometry, Books 1, 2, 3, 4 and 6, in Chambers or Todhunter, or Books 1, 2, 3, 4 and 5 as in } Legendre and Davies.....		60 on 100
Logarithms.....		50 on 100
Algebra, including quadratic equations, Loomis' edition.....		50 on 100

CANDIDATES ARE EXAMINED ON THE FOLLOWING SUBJECTS.

FOR ADMISSION TO PRACTICE.

<i>Subjects.</i>	<i>Authors recommended</i>	<i>Number of points to be retained.</i>
Arithmetic.....	Christian Brothers.....	60 on 100
Algebra, including quadratic equations. }	Loomis' edition.....	50 on 100
Geometry } Books 1, 2, 3, 4 and 6—Chambers or do 1, 2, 3, 4 and 5—Davies, Legendre... }		60 on 100
Logarithms.....		60 on 100
Mensuration of Solids and Surfaces. }	Baillargé or Chambers.....	60 on 100
Plane Trigonometry { Chambers, Davies.....		60 on 100
Spherical Trigonometry { Legendre.....		50 on 100
Analytical Trigonometry to the extent of being able to deduce all plane and spherical formulas for triangles. }	Galbraith, Houghton, Chambers, Davies, Legendre. }	50 on 100
Practical Astronomy, as applied to the finding of time, latitude, Azimuth, &c, with the ordinary surveying instruments. }	Loomis.....	50 on 100

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Construction, use and ad- justment of the Compass, Transit, Sextant, Theo- dolite, Level, Aneroid Barometer.	}	Gillespie.	60 on 100
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be retained

Practical surveying, includ- ing the division of land, Levelling, &c.	}	Gillespie, Simms	60 on 100
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Linear drawing, Topography	}	Gillespie.....	50 on 100
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Laws of Surveys and Pres- cription in the Province of Quebec. Boundaries and Procès-verbal, &c.	}	Civil-Code. Title X, Chap. V.; Re- vised Statutes of the Province of Quebec.	60 on 100
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Elements of Botany —	Moyen	50 on 100
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Elements of mineralogy —	Laflamme	50 on 100
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Elements of Geology —	Laflamme	50 on 100
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STUDY

Questions that were submitted to the candidates who were before the Board in april and october 1890 to be admitnd to study the profession.

ARITHMETIC

1° Perform the operations indicated in the following expression and simplify them.

$$\frac{(\frac{1}{2} \text{ de } \frac{3}{4} \text{ de } \frac{1}{2}) \times (4 \frac{2}{3} \text{ of } 40)}{\frac{1\frac{1}{2}}{3} + \frac{6}{2\frac{3}{4}} - (\frac{4}{5} - \frac{3}{4})}$$

2° If 33 $\frac{1}{2}$ yds of stuff cost \$30. 45. What will be the cost of 67 yds?

3° It was intended to perform a certain work with 144 men in 68 days: But when beginning operations a certain number of men were discharged, and the work was performed in 48 days instead. How many men were employed?

4° What is the smallest common multiple of 20, 24, 33?

5° A can perform a certain piece of work in 20 days. B can do the same in 24 days. C will do the same work in 30 days. In what length of time will the three parties do the same work if they join together?

6° Divide 0.00546 by 0.00000645.

7° Extract the root of $\sqrt{4124961}$.

8° Extract the root of $\sqrt[3]{9.66}$ and give the result in 4 decimals.

9° A garrison of 600 men has provisions for 50 days. What fraction of the provisions will each man consume per day?

10° The wheels of a carriage are 12 feet in circumference and perform

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30 revolutions in a minute. In what length of time will the carriage travel 130 miles?

11° What is the number which deducted 708 times from 688,953 will leave 69?

12° Divide 464.8532 by 27.234 as far as 6 decimals.

13° Find the greatest common divisor of 68590142 $\times$ 85044089.

14° A merchant selling tea at 60 cts per lb, is at a loss of 20 %. What should he sell his tea to realise a profit of 20 %?

ALGEBRA

1° Why is the difference between positive and negative quantities the sum of said quantities? whilst between quantities of the same sign it is the difference itself of such quantities.

2° What is the greatest common divisor of
 $20x^4 + x^2 - 1$ and $25x^4 + 5x^3 - x - 1$.

3° Resolve $3\frac{1}{2}(x - 9) + \frac{3x}{2} = \frac{3}{4}(x + 2) + x - \frac{x}{2\frac{1}{2}}$

4° The sum of two numbers is 100, and the difference of the squares of the same numbers is 1000. Find the numbers.

5° $-A[-b + c + \{a + c - d(a + c) - b - c\} + (a - c + d)]$.

6° Multiply $a^m b^n + a b^{-x}$ by
 $a^x - b^n$

7° Divide $32a^4 + 54ab^3 - 81b^4$, par $2a + 3b$.

8° Give the value of x in the following:
 $ax - c = bx + d$.

9. The length of a field is equal to twice its width. An other field having 50 yds more in its length and .0 yds more in its breadth contains 6800 square yards more than the first mentioned field. Find the size of each field.

10. The sum of two numbers is 100. The sum of their squares is 5018. Find the two numbers.

LOGARITHMS

$$1. \sqrt[7]{92.335 \times 0.436 \div 320.05 \div 0.0025}$$

2. Calculate by logarithms the following expression

$$\left(\frac{19}{36} \text{ of } \frac{43}{55}\right) \div 0.32 \text{ of } 0.032$$

3. Solve by logarithms

$$\frac{95}{97} \div \frac{103}{127} :: 52 : x.$$

4. You have $a = 234$. Calculate the following.

$$432 \sqrt[7]{\frac{78 a \sqrt[4]{a^2}}{a^3 \sqrt[3]{3a^{-3}}}}$$

5. Find out the log. of $42 \frac{36}{125}$

6. Calculate by logarithms the following expression

$$1238 \sqrt[5]{7 \times 6.928} \div \left(9 \sqrt[7]{733}\right) \left(\frac{77}{89}\right)$$

7. Calculate by log. $\frac{1}{2}$ of $\frac{1}{3}$ of $\frac{1}{4}$.

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8. Express in logarithms the 24th power of
1.00007.

9. Calculate $\frac{329}{327} : \frac{136}{458} :: 0.316 : x$.

PLANE GEOMETRY

1° What is the measure of an angle having its summit in the interior of the circumference of a circle? And what is the measure of an angle having its summit outside of the circumference of a circle, the two sides of which angle are secants to the circle?

2° Demonstrate that the sum of the interior angles of any rectilinear figure, is equal to as many times, two right angles, as the number of sides forming the figure, less two.

3° Any parallelogram has a surface equal to that of a rectangle of the same base and of the same height. Demonstrate.

4° In any triangle what will equal the square of a side opposite to an acute angle? Demonstrate.

5° In any triangle, the rectangle of two sides is equal to the product of the diameter of the circumscribed circle by the perpendicular drawn on the third side from the opposite summit. Demonstrate.

6° When the diameter of a sphere is represented by D, give the formula that will express its volume.

7° In any polygon, the sides of which are produced in the same direction, the exterior angles together are equal to four right angles. Demonstrate.

8° Two angles having their sides perpendicular each to each are equal. Demonstrate.

9° In what ratio does the bisectrice of an angle cut the side opposite to that angle. Demonstrate.

10° Prove that two tangents drawn to a circle from any point outside are equal.

HISTORY OF CANADA

1° Montreal under Maisonneuve.

2° Administration of de Callières.

3° The monasteries of female sex in Canada under the french regime.

4° The debate on the subsidies and the 92 resolutions.

5° State in a few words the discovery of the Mississipi.

6° Administration of Beauharnais.

7° Campaign of 1813 and 1814.

8° Disturbance of 1837.

GEOGRAPHY

1° What are the main tributaries of the St Lawrence on the north shore ?

2° Name the capitals of the following countries : New-Brunswick, Newfoundland, Sweden, Denmark, Hungary, Persia, Egypt, Paraguay, and Uruguay.

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3° Location, direction, source and mouth, mean length of the following rivers ; Hudson, Missouri, Colorado, Fraser, McKinzie, Tagus, Mersey, Escant and Elba.

4° Mountains of the North-west Territories and South America.

5° State the main tributaries of the St Lawrence on the south shore, and give the source and the general course of each of them.

6° What are the English possessions in the West-Indies ?

7° What are the main rivers of Africa ? A few details on their source and where is situated the mouth of said rivers ?

8° What are the capitals of the following countries ; Perou, Chily, Equator, Mexico, Turkey and Persia ?

PRACTICE

Questions that were submitted to the candidates who were before the Board in april and october 1890, to be admitted to practice.

ARITHMETIC.

1° A garnison of 800 men has provisions for 60 days, but at the end of 15 days 80 men have died. For how many days will the men remaining have provisions ?

2° $\frac{2}{9.66}$

3° Water by freezing expands $\frac{1}{4}$ in volume. How many cubic feet are contained in a block of ice $445 + 100 + 175$ feet ?

4° A, B and C have let a pasture at the rate of \$70.56 for the season. A had in the pasture 36 heads of cattle for 5 months. B had 48 for 4 months; and C 72 for 3 months. What is the share of each in the rent to be paid for the pasture?

$$5, \frac{3\frac{1}{2}}{12} - \left(1\frac{1}{6} \text{ of } 1\frac{1}{2}\right) + 8 \div \frac{0.5 - .005}{.25 \div .5}$$

6° Multiply 25 weeks, 6 days, 7 hours, 30 minutes and 20 seconds, by $5\frac{3}{4}$.

7° If 40 acres of land, valued at 30 shillings an acre, are exchanged for 56 acres; what is the value per acre of the last mentioned lot of land?

8° A man owns $\frac{3}{4}$ of a mine. He sells $\frac{1}{4}$ of his share for £ 171. What is at that rate the value of the whole mine and the value of his share?

9° A ship at sea springs a leak, and the water rises in the ship at the rate of $6\frac{1}{3}$ tons in 27 minutes. The pumps will throw 11 tons an hour. The ship was sailing at the rate of 10 miles an hour, and when it struck the shore it contained 70 tons of water. At what distance from the shore was the ship, when it sprung a leak.

$$10^{\circ} \frac{\frac{3}{4} \text{ of } \frac{4}{3} + 3\frac{1}{2} - \frac{3}{4}}{\frac{8\frac{1}{2}}{7} + \frac{4}{3\frac{1}{4}} - \frac{1\frac{1}{2}}{2\frac{1}{3}}}$$

11° I bought a cask of wine, containing 52 gallons for \$2.60 per gallon, 7 gallons leaked out of the cask. What price per gallon should I sell the remainder to make a profit of $37\frac{1}{2}$ per cent on the cost price?

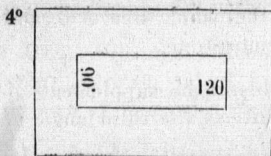
ALGEBRA

$$1^{\circ} \text{ Multiply } a^m b^n - 2 a^n b^m + a^{-m} b^y \\ a b^{-n} \times a^{-m} b^n$$

2° Express the value of x from the following :

$$\frac{x-a}{b} - 1 = \frac{b+x}{x}$$

3° The difference of 2 numbers is 7, and the difference of their cubes is 4501. Find the two numbers.



A lot of land of rectangular form, is 60 chs on one side and 120 chs on other. It is required to double the area of the land by exterior lines parallel to the lines of the first lot and at equal distance from the perimeter. What should be the distance between the sides?

5° Simplify and find the value of a in the following :

$$\sqrt[3]{a^3 \sqrt{b^3}} = \frac{1}{2} \sqrt{32 a^{-2} \sqrt[3]{b}}$$

6° Multiply $a^2 b^x + a^x b^2 + b^{-x}$ by $a b + a^x$.

7° $A^6 + 3 a^3 y^3 + y^6 + a^2 = a y + y^2$.

8° The difference of 2 numbers is 6, and the difference of their squares is 480. Find those numbers.

9° A loan is made of a certain sum of money to be refunded in three equal instalments of \$9,261.00. The first instalment to be paid in 1 year, the second in two years, and the third in three years. Interest at 5 % What is the sum loaned?

10° The length of a field is equal to $1\frac{1}{2}$ its breadth. An other field having 25 arpents more in length, but of the same width as the first, contains 800 acres more in superficie. Give the dimensions of each field.

GEOMETRY

1. Prove that the triangle having for its summit the centers of the sides of a given triangle, is similar to this last triangle.

2° Construct graphically a triangle, being given its base, its height and the angle opposite to its base.

3° Having the value of two parallel chords, in a circle and the distance between these two chords; how do you find the radius of the circle?

4. If a line A B is divided into two un-equal parts A C, and C B, What is the ratio between the square of the whole line A B. and the squares of both segments A C and B C Demonstrate.

5° Demonstrate that the lines which bisect the supplements of two angles of a triangle and also the line which bisects the third angle of the same triangle, meet in the same point.

6. Find out the greatest square that may be inscribed in a triangle the sides of which are.

12, 14, 16

7° In what ratio the diagonals of a parallelogram bisect each other? Demonstrate.

8. Demonstrate that the volume of a sphere is equal to the surface of the sphere multiplied by $\frac{1}{3}$ of the radius. And give the formula expressing the volume of the sphere in function of the diameter D.

9° Draw a straight line tangent to two given circles. Explain your method of proceeding.

SURFACES AND VOLUMES

1° The surface of a circle, less the surface of the inscribed equilateral triangle is 2,948.14. What is the surface of the triangle? *side = 120*
area = 360√3

2° The side of a cone is 28.5; the surface of its base is 6 square feet. Find out by calculation the surface of the parallel circle distant $2\frac{1}{2}$ feet from the base.

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3° It is intended to gild a cupola of semispherical form, having a diameter of 20 feet on the outside, with leaves of gold 3 inches by 4. How many leaves of gold will be required ?

4° A cask, being two equal truncated cones, is 28 inches in its greatest diameter, and 20 inches at the two ends. Its length is 40 inches. How many gallons of 231 inches will it contain ?

5° A wheel revolves twice in a distance of $16\frac{1}{2}$ feet ; and it requires 200 revolutions of the wheel to travel round a garden circular in form. Find the area of the garden in acres, roods and perches.

6° A cylindrical vase is filled with water to the brim. A piece of metal, having a volume of $46\frac{1}{2}$, is plunged therein and being withdrawn the water was lowered $1\frac{1}{2}$ inches. What is the volume of the vase assuming that its diameter is half its length ?

7° What is the surface of a circle, in which a segment has a chord of 60, its height being 8 ?

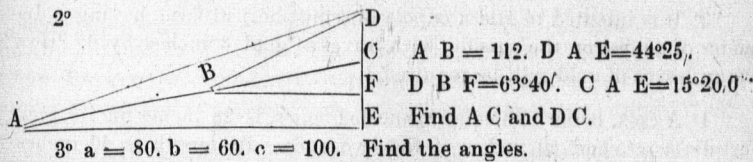
8° How many yards of oil cloth, 21 inches in width, will be required to cover the floor of a room $17 + 27$ feet ?

9° Give the formulas generally followed to find the surface of a spherical segment and the volume of a cone.

10° What is the volume of a piece of wood 24 feet in length, having $30 + 27$ inches at one end and $34 + 18$ inches at the other ?

PLANE TRIGONOMETRY

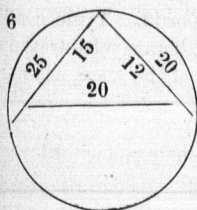
1° From a point outside, two secants are drawn towards the extremity of a diameter. The angle of intersections of the two secants is $60^\circ 44'$, and the distance between the two points whereat the secants cross the circle is 4. What is the radius of the circle ?



3° $a = 80$. $b = 60$. $c = 100$. Find the angles.

4° $b = 176$. $a = 133$. $c = 73^\circ$. Find the remainder.

5° In a rectangle triangle the hypotenuse is 1246 and one of the oblique angles is $25^\circ 30' 0''$. Find the rest



6

In a circle are inscribed two consecutive chords being respectively 25 and 20. Another line of 20 is run to intersect the two chords, and forms with the segments of the two chords a triangle the sides of which are 20, 15 12. Find the radius of the circle.

7° $A = 59^\circ$; $C = 52^\circ 15'$; $c = 276.5$. Find the remainder

8° From a point A the two ends of a lake can be seen under an angle of $40^\circ 33' 12''$. The distance $A B$, is 153 yards, and the distance $A C$ is 137 yards. What is the length of the lake?

9° A tower on the sea shore is 143 in height. From the summit of the tower the angle of depression to a ship at sea is 35° . Find the distance from the ship to the foot of the tower.

SPHERICAL TRIGONOMETRY

1° Show on a diagram P the pole, Z the zenith, S the position of a star, the longitude and latitude of a supposed meridian, (the Greenwich meridian for instance). Also the azimuth, the height, the declination and the hour angle of the star. What do you understand by first vertical?

2° What is a spherical triangle ? How is measured a spherical triangle ? What do you understand by arcs and angles of the same kind or affection ? How many cases in the solution of spherical triangles, and what are they ?

3° The hypotenuse of a spherical triangle is $75^{\circ} 20'$, and one of the sides is $64^{\circ} 10'$. Find the other parts.

4° A spherical triangle, on the surface of the globe, has a superficie of 300 square miles. What will be the excess of the sum of its angles over 180° ?

5° When does it occur in a spherical triangle that there can be but one solution or two solution or no solution what ever.

6° What do you mean by spherical excess and convergence of the meridian ? What can be the practical application of the spherical excess and the converging of meridians ?

7° The three angles of a spherical triangle are given, express the formula that will give the side A.

$$8^{\circ} a = 62^{\circ} 54' 4''$$

$$b = 125^{\circ} 20'$$

$$c = 131^{\circ} 30'. \text{ Find angle C.}$$

$$9^{\circ} A = 51^{\circ} 30'$$

$$B = 59^{\circ} 16'$$

$$a = 63^{\circ} 50'. \text{ Find b.}$$

ANALYTICAL TRIGONOMETRY (PLANE)

1° Deduce the formulas giving the value of $\sin A + B$ and $A - B$.

2° Prove that $\frac{\sin A}{\sin B} = \frac{a}{b}$.

3° Give the value of the trigonometrical lines in relation to an angle of 60° .

4° Prove that $\sin \frac{1}{2} A = \sqrt{\frac{(s-b)(s-c)}{bc}}$

5° Prove that $\sin A = \sqrt{\frac{\sec^2 A - 1}{\sec A}}$

6° Express $\tan A \times \cotang A$ by a single trigonometrical fraction.

7° $\sin (A \times B) = \sin A \cos B - \cos A \sin B$. Demonstrate.

8° Express the value of $\tan (A + B)$ and $\tan (A - B)$.

9° Express in functions $B \sin$ and cosine all the other trigonometrical lines.

10° When do sine, cosine, tangent require positive signs, and when do they require negative signs?

ASTRONOMY

1° On the 23th october 1889 at 3^h 30" P. M. in latitude 45° 32' N. the corrected altitude of the center of the sun was 8° 27' 14"; the reading on the horizontal limb directed towards the center of the sun was 120° 31' 30", and directed on a staff the reading was 0° 0". What was the azimuth of the staff?

2° Quebec A

Latitude 46° 28' 20" N.

Longitude 71° 12' 15" W.

Montreal B.

Lat. 45° 31' 30" N.

Long. 73° 0' 15" W.

What is, between these two points, the length of an arc of a great circle expressed in geographical miles.

3° What is the astronomical time corresponding to 11^h 40" A. M. on 1st of August?

What is the astronomical time corresponding to 14^h 12" astr. time on 12th July?

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On the 19th of June at 7^h 10' 10" A. M. in longitude 90° 37' 30" E, what is the Greenwich time ?

Find the Greenwich time corresponding to 2^h 41' 13" P. M. on 30th of August, in longitude 5^h 02' 22" E

4° The distance between two cities being 2,897 geographical miles = 48° 17' ; the latitude of one of the cities was 38° 35', and the difference of longitude of the two cities was 41° 28'. Find the difference in their latitudes.

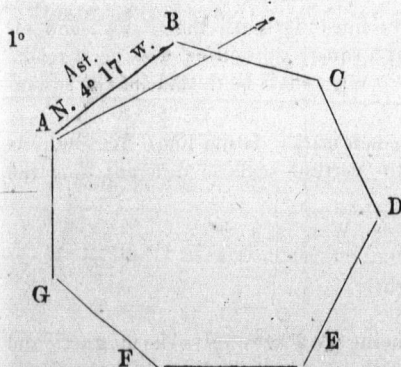
5° Draw a diagram and show thereon a meridian, a vertical circle the right ascension, the declination, the azimuth, the latitude, and the altitude of a star.

6° Construct a diagram showing Polaris at its greatest elongation.

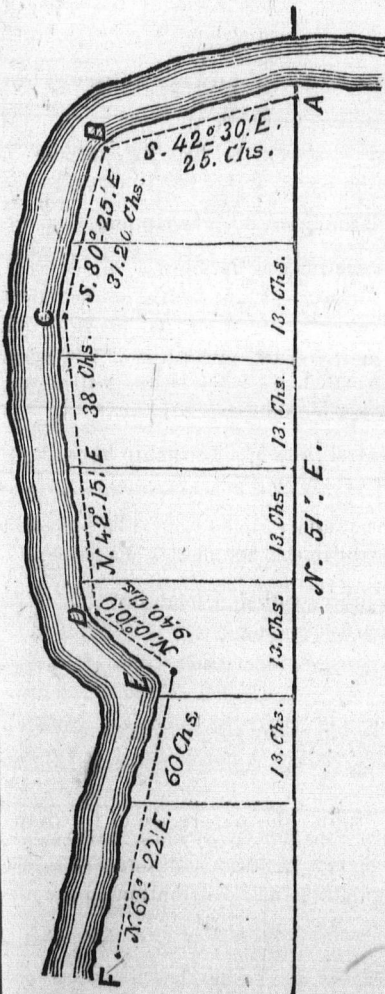
In lat 45° N. the polar distance of Polaris was 1° 16' 46". What was its azimuth at the elongation ?

7° State in a few words what is meant by refraction, aberration, parallax, and the effects resulting therefrom on the sun and the stars.

PROBLEMS ON PRATICAL SURVEYING



In a regular heptagon the course of A B is N. 4° 17' west astr. and the side B C deflects to the right, the declination being 13° 30' west, what are the magnetical and astronomical courses of all the sides in the figure ?



7° A river is the front of a range in a Township, and the lots are 13 chs. in width. The bearing of the front lines is N. 51° East and the bearing of the side lines for the lots is S. 39° East. The river crosses the range line at 18 chs. from the first post and then runs as follows :

AB : S 42°-30' E. = 25.00 chs.
 BC : S. 80°-25' E. = 31.20 "
 CD : N. 42°-15' E. = 38.00 "
 DE : N. 10°-10' W. = 9.40 "
 EF : N. 63°-22' E. = 60.00 "

Determine by calculation where on the above courses will fall the side lines dividing the different lots.

8° In a line of level 40 chs in length, what is the correction for refraction and the curve of the earth ?

Questions on law relating to immoveables and land Surveying

- 1° Under what conditions must possession be had for purpose of prescription ?
- 2° Name some of the causes wich may prevent prescription.
- 3° In general what immoveables are imprescriptible ?
- 4° What kind of prescription releases from all obligation ?
- 5° When the posts as boundary marks of lots in a range of Township have been obliterated or have disappeared, by what means will a surveyor find out the position of the former boundaries ?
- 6° When the main exterior or central lines of a Township have disappeared. Who is anthorized to retrace such lines ?
- 7° In cities or other places when boundary stones cannot be placed in position, how can a land surveyor establish the boundaries of a property ?
- 8° What have you to insert in a proces-verbal of boundary ?

GEOLOGY

1. Veins, their structure, their origin ; the importance of its knowledge for economical purposes.
- 2° Fossils, Definition. Laws regulating their distribution in the different strata.
- 3° Geysers and hot water springs.
- 4° A few words on the lower silurian formation of the Province of Quebec.

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7° By what characteristics do you discover in the Province of Quebec the existence of the quaternary glacier ?

8° The mesozoic period. What is its principal paleontological character ? Are such strata to be found in the Province of Quebec ?

MINEROLOGY

1° State the law of Romée de Lisle as modified by mitsterlich in relation to the angles of dièdres ?

2° Give a definition of the following groups : hemitropy, transposition, druses. What are dentrites and state how they are formed ?

3° What is the difference between the metallic and the metalloid glare of rocks ? Give a description of the crystalline systems of refraction single and double.

4° Give the composition, crystalline system and distinctive characters of the following species : Quartz, calcite, coal, iron pyrites, chalcopryrite and galena

5° Give a definition of what is meant by irregular groups of crystals. The appearance and origin of dentrites and druses.

6° A definition of hardness in relation to rocks. What is a scale of hardness ? And how is it made use of ?

7° State the chemical composition, the most striking physical characters, the bearing and the use of the following species. Amphitite, apatite, galena, and chalcopryrite.

5° Spreading of seeds.

6° How will you know by the leaf of a plant, if it belongs to the monocotyledonous or decotyledonous species? Can you always depend on that character?

7° What is the histological composition of the woods in our forests?

8° Structure and use of the bark.

9° How is produced the growth of the stems in our trees? And why is it that trees in the forests bear no branches at a certain distance from the ground?