

near the mouth of the latter. It then skirts the shore of the Georgian Bay to Algoma Mills, which will be for some time the western limit of the work of construction. Part of the section between Callander and Algoma Mills is under contract and the whole line from Montreal to the latter point will probably be in operation in a few months.

From Algoma Mills westward the main line will probably be continued around Lake Superior and as close to the Lake as engineering considerations will admit of, the country being rocky and construction difficult. At the east end of the lake it will pass within twenty or thirty miles of Sault Ste Marie, and at the west end it will connect with what is known as the Thunder Bay branch at some point on the latter not yet fixed, but from present indications the junction will be close to the terminus at Prince Arthur's Landing.

The Thunder Bay branch, including the whole of the section between Lake Superior and Red River will henceforth be part of the main line. It has been under construction for several years past and will be ready for the carriage of passengers and freight after the first of July next, though the work of ballasting will not be completed till the summer of 1883.

It was originally intended that the crossing of the Red River should be at Selkirk, and that the main line should cross the narrows of Lake Manitoba and take a northerly route by way of Battleford and Edmonton to the Yellow Head pass of the Rocky Mountains. The idea of crossing at Selkirk has been temporarily, if not finally, abandoned and a railway bridge has been built at Winnipeg. The part of the Pembina branch between Winnipeg and Selkirk thus becomes part of the main line which now runs westward from Winnipeg by way of Portage la Prairie to Brandon where it crosses the Assiniboine River. Brandon, according to the official map issued by the Canada Pacific Company, is some three or four miles east of the 100th meridian, and from this point to Winnipeg and Emerson the road is open for traffic.

From Brandon westward the main line has been definitely located up the valley of the Qu'Appelle River, on the south side of the latter, as far as Moose Jaw Creek. This is a small tributary of the Qu'Appelle from the south, and it is crossed about midway between the 105th and 106th meridians. The Company have applied to Parliament for leave to substitute the Kicking Horse for the Yellow Head pass, and pending the completion of the explorations in the Rocky Mountains it has been agreed to finally locate no more of the road until it is ascertained whether the proposed route is feasible.

The Kicking Horse Pass lies a few miles north of the 51st parallel of latitude, while Kamloops Lake, on the west side of the Rocky Mountains, lies about the same distance south of it. Should this pass receive the final approval of the Government, the main line will be continued westward from Moose Jaw Creek across the South Saskatchewan, between the Calgary and Old Bow forts, and through the Rocky and Selkirk Mountain ranges to connect with the section now under construction in British Columbia between Kamloops and Yale. Between the last named two points—or rather between Savona's Ferry, near the east end of Kamloops Lake and Emory's Bar near Yale—the line follows very closely the valleys of the Thompson and Fraser rivers. A few weeks ago the contract for the construction of the remainder of the main line—namely, from Emory's Bar to Port Moody—was let by the Government. The route lies for some distance south of Yale on the west side of Fraser River, and then crosses it so as to reach Port Moody, which is some miles north of the mouth of the Fraser. There will probably be a branch to connect New Westminster with the main line.

The new branches of the Canada Pacific at present are: (1) a line into Sault Ste Marie from Algoma Mills; (2) the Pembina branch from St. Boniface to Emerson, east of the Red River; (3) the Winnipeg and Pembina Mountain branch from Winnipeg west of Red River to Smuggler's Point—which is on the United States frontier, about thirteen miles west of Emerson—with a westerly extension to the Souris River running fifteen miles north of the frontier; (4) the Brandon and Souris branch from Brandon south westerly to a point on the western boundary of Manitoba about fifteen miles north of the frontier, with a westerly extension parallel to the boundary line as far as the 109th meridian; and (5) the Winnipeg and Stonewall branch. The Pembina branch has been in operation for two years past. The Winnipeg and Pembina Mountain branch is largely graded and the work of track-laying has been commenced. The other branches are merely located. Several branches northward from the main line have been projected, but they are not yet finally located, or accepted by the Government.

Adopting the Kicking Horse Pass the length of the main line from Montreal to Port Moody is 2950 miles. The following table of approximate distances is computed from the reports of the Minister of Railways, and is given subject to corrections made as the result of more accurate measurements hereafter:—

#### MAIN LINE.

Montreal to Port Moody.....	2950 miles.
Montreal to Ottawa.....	120 "
Ottawa to Callander.....	235½ "
Callander to Prince Arthur's Landing.....	650 "
Prince Arthur's Landing to Winnipeg.....	434 "
Winnipeg to Portage la Prairie.....	53½ "
Portage la Prairie to Brandon.....	74 "
Brandon to Moose Jaw Creek.....	275½ "
Kamloops to Port Moody.....	215 "

#### BRANCHES.

Carleton Place to Brockville.....	45½ "
Algoma Mills to Sault Ste Marie.....	50 "
St. Boniface to Emerson.....	64 "
Winnipeg to Stonewall.....	20 "
Winnipeg and Pembina Mountain branch.....	220 "
Brandon and Souris branch.....	195 "

In connection with the above or any subsequent geographical sketch any further information, so far as the facts are obtainable, will be cheerfully given to any correspondent who applies for it.

### Mathematical Department.

#### UNIVERSITY OF TORONTO.

##### JUNIOR MATRICULATION—1881.

##### PROBLEMS.—HONORS.

1. If a straight line terminated by the sides of a triangle be bisected, no other line terminated by the same two sides can be bisected in the same point.
2. If two equal circles be described cutting each other in  $A$  and  $B$ , and from  $A$  a chord be drawn cutting them in  $C$  and  $D$ , prove that the part  $CD$  between the circumferences will be bisected by the circle described on  $AB$  as diameter.
3. Circles are described on two of the sides of a triangle as diameters, and each meets the perpendicular from the opposite angular point on its diameter in two points; prove that these four points lie on a circle whose centre is at the intersection of the two sides.

$$4. \text{ Prove that } \frac{a^2\left(\frac{1}{b}-\frac{1}{c}\right)+b^2\left(\frac{1}{c}-\frac{1}{a}\right)+c^2\left(\frac{1}{a}-\frac{1}{b}\right)}{a\left(\frac{1}{b}-\frac{1}{c}\right)+\left(\frac{1}{c}-\frac{1}{a}\right)+\left(\frac{1}{a}-\frac{1}{b}\right)}=a+b+c.$$