

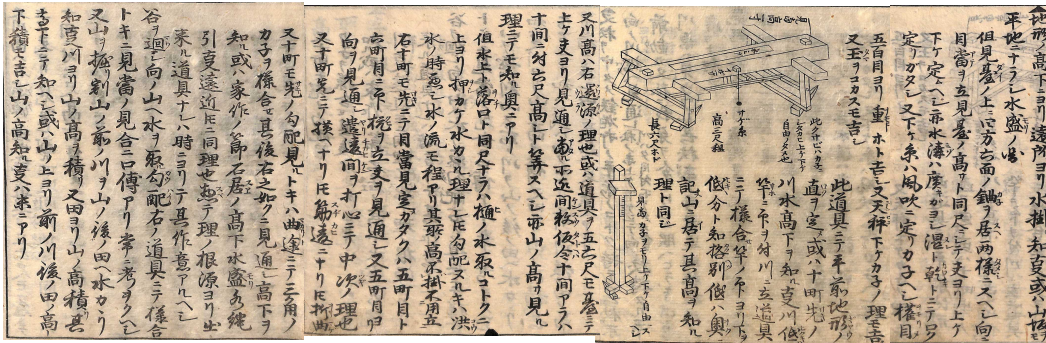
# 竜ヶ崎第一高等学校 白幡探究Ⅰ 数学領域

## 水平な土地を生み出す making horizontal land

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### 原文



### キーワード

水平  
測量  
傾斜地

### Keyword

Horizontally  
Surveying  
Slant place

### 現代語訳 modern translation

地形の高低差を利用して遠いところから水を引いてくる。そして、下記の操作を行うことによって、坂道でさえも平地にならすことができる。

まず、見台の上に立方体の力子を置き、その反対側目にあててをたてて、見台と目当てを同じ高さにし、それより上下に動かし定める。また、水溝は広い方がよい。下げ糸につける力子のおもさは重り目が500目より重いと、風が吹いても水平かどうか定めることができる。力子は天秤に下げて使う。この見台で坂道の垂直を定める。十町(1.1km)先の川の深さを知る方法は、川に印を付けた竿を立てて、見台で見比べて、竿の印よりさらに低い場合は下記の、山からその高さを測る方法と同じである。川の高さは、竿の印の高さより高い場合の方法、或いは道具を56尺の見台にて上にそれより見通しあたるところの間の幅、例えば間の距離が10間だと約6尺高さの差が出る。また山の高さを見る方法が奥に記されている。ただし、水の上と水の流れが落下するところが同じなら、桶の水をすくいとり上からかけると水が流れる。理由は斜面の角度が緩やかだと、洪水が発生したときの悪い水の流れもそれほどでもない。その場所の高さで水をかける行程を行わないと水平かどうかわからない。右の方へ十町(1.1km)先にて目当てで定定めつつ五町(550m)と六町(660m)に杭を立て、それを見通し中心を打とうと考えると次の方法になる。また、十町(1.1km)先にて横に進み筋違を折り曲げ、斜面の角度を見るときは曲がり途中にて三角の力子を合わせてその後、上記のように見通し高さを測る或いは家を造るとき石を据えた高さで汲んだ水を水縄で引き、水平性を保つことは遠くても近くても同じ。全て同じ根拠よりできる道具ならば場合によってその作意がなければならぬ。谷をまわって向かいの山へ水をとり斜面の角度を上記の道具で見比べるときに目当てまた山を掘りその前の川を山の後ろの田へ水が流れてゆく。川から山の高さ計測し、また田から山の高さを計測し、その差で知ることができる、或いは山の上で川の後ろの田との高低差を測ってもよいだろう。

係: 山尾 吉野

Using the difference of ups and downs in the topography, I'm irrigating from a far place. And it's even possible to make a slope be a plain by doing the following operation. First I put the power child of a cube on the bookstand, build one for an eye opposite to it, make the bookstand and the aim the same height, move it to the top and the bottom more than that and decide. The wide one is preferred in a water ditch. When a sinker eye is heavier than 500 eyes, even if the wind blows, heaviness of the power child who lowers and puts it on the thread can decide whether it's level. The power child hangs on a balance and uses it. Verticalness on the slope is set by this bookstand. The way to know the depth of the river ahead of Juccho (1.1km) makes the arm which marked a river and compares by a bookstand, and when being lower than a mark of an arm, is same as the way to measure its height from the following mountain. I'm going to look through the way when the height of the river is higher than the height of the mark of an arm, or a tool more than that in the top in 56 measures of bookstand and take on, time, if the width for example the distance of the time are for 10, the difference in about 6 measure height goes out. All over Mt. of the way to see the height is recorded on the inside. But, if on the water and the place down which a flow of water falls are same, when I skim water of a tub and call from the top, water runs. When the angle of the slope is gentle for a reason, the bad flow of no water when a flood occurred, is also so. When the journey over which water is poured by the height of its location isn't performed, I don't know whether it's level. When a post is put up in Gocho (550m) and Rokucho (660m), making sure by the aim in Juccho (1.1 km) front to the right way, and thinks I'll look through that and strike the center, it'll be the next way. I join the hands a child of the triangle and learn about the perspective height as mentioned above after that or when making a house with the curve way when advancing towards the side in Juccho (1.1 km) front, bending sujii and seeing the angle of the slope, even if it's close even if it's far, it's same to pull the water which was drawn by the height on which a stone was put by Mino and keep level. When it's the tool everything can be set more than the same root, when you can cry, the intention won't be by a case. At the time when water is taken to the mountain opposite via a valley and the angle of the slope is compared by a tool above-mentioned, the aim, all over Mt. of of the river which digs and is in front of it water is running into a rice field behind the mountain. A high school in a mountain measures also measures the height of the mountain from a rice field from a river, and the difference of ups and downs with the rice field or on the mountain and behind the river it's possible to know by its difference may

### 数学的内容 mathematical content

私たちは、数学的な考え方で測量を可能にする道具について説明しようと思う。

まず測量するにあたって必ずしも土地が平坦であるとは限らないので、整地をすることが必要である。—その整地を行うための道具が、水平器—その道具の使い方は、以下の通りである。

- 1 水溝に水を入れる (この水がこぼれなければ、土地は平らであるといえる)
- 2 目盛りのついた木の棒を使って仕上げの高さの位置を固定する
- 3 水平器は高さ調節が出来るので、上下に動かしながら水平器が水平になるようにする
- 4 整地したときの仕上げの高さの位置に、木の棒をたてる
- 5 水平器の高さに目をあわせ、木の棒のところに印を付ける
- 6 土地を掘り取って出来る仕上げの位置に木の棒を立て、同じく水平器を通してのぞき、木の棒につけた印がちょうど下がってきた高さまで土地を掘り取る

これで土地の整地が完成!

係: 吉田 淀名和

We think rather than mathematical thinking, trying to describe a tool that allows the surveying of a mathematical idea.

Since necessarily, when initially land is not flat, it is necessary to ground leveling. —In order to per from the leveling tool is horizontal unit—

How to use the tool is as follow.

- 1 Put the water in the water groove. (If spills the water, it can be said that the land is flat.)
  - 2 Be using a wooden stick that has a scale and please fix the position of the height of the finish.
  - 3 Because can adjust the horizontal instrument height, horizontal instrument while moving up and down is please to become horizontal.
  - 4 The height position of the finish when the leveling, please make a wooden stick.
  - 5 Align the eye to the height of the horizontal instrument, please mark the place of a wooden stick.
  - 6 And make a wooden stick to the position of finish that can be dug the land, the same level gauge, except through, take digging land to a height that marks you made on a wooden stick has been just dropped.
- This leveling of land was completed!!

### まとめ・今後の課題・感想

#### まとめ

昔の人々は、数学と真剣に向き合っていた。未来の人々からしたら僕たちも、昔の人々になるわけだから、「嫌いだから」「苦手だから」などと言わずに、真剣に数学に向き合わないといけないと思う。

#### 今後の課題

昔の人々は、建物を建てる時の大前提となる「水平な土地」を上記のようにして、生み出していた。日本では、昔から物事の「土台」となる部分をとても大切にきたということがわかり、それは現代にもしっかり受け継がれているといえる。

#### 感想

今回、自分たちが取り組んだ課題には、数学的要素が少なく、だいぶ苦戦してしまっただし、現代語訳も難しかった。この原文を正確に伝えることが出来なかったのは残念だが、全員が真剣に課題に取り組み協力したことで、これを完成させる事ができてよかった。

Old people will be the major premise when building a building.

"Level land" was done and produced as mentioned above.

I understand that the part of which I become "foundation" of a matter from the past has been made very important in Japan, and it can be said that that is also inherited tightly today.

There were few mathematical elements in the problem on which one worked this time, and a modern translation had had a hard time a lot and was also difficult.

It was regrettable that this original couldn't be told correctly, but it might be possible to be the case that all the members worked on a problem and cooperated seriously and complete this.

