

# How to Measure the Prism Constant of A Surveyors Prism (Three Peg Test)



Written By **GEORGE MYLNE** | Category: **SURVEYING**



A three peg test is used to measure the prism constant of a prism. This can be used to either verify the manufacturers stated prism constant or to determine the prism constant for a prism where it is not known.

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## When You Need to Do a Three Peg Test

A three peg test is needed when:

- You have purchased a new prism and you want to verify the manufacturers stated prism constant.
- You need to do high accuracy control work and want to use a measured prism constant, not just what the manufacturer stated.
- You don't know what the prism constant is of a prism and need to find out what it is.

## How to do a three peg test

## **Important:**

- **When doing a three peg test make sure you only use the one prism that you are wanting to test, and you don't mix in multiple prisms.**
- **Before recording any measurements, set the prism constant to 0. This is to make it easier to calculate the measured prism constant of the prism.**
- **When taking and recording measurements, record horizontal distance only.**

## **Equipment**

The equipment needed to do a three peg test is:

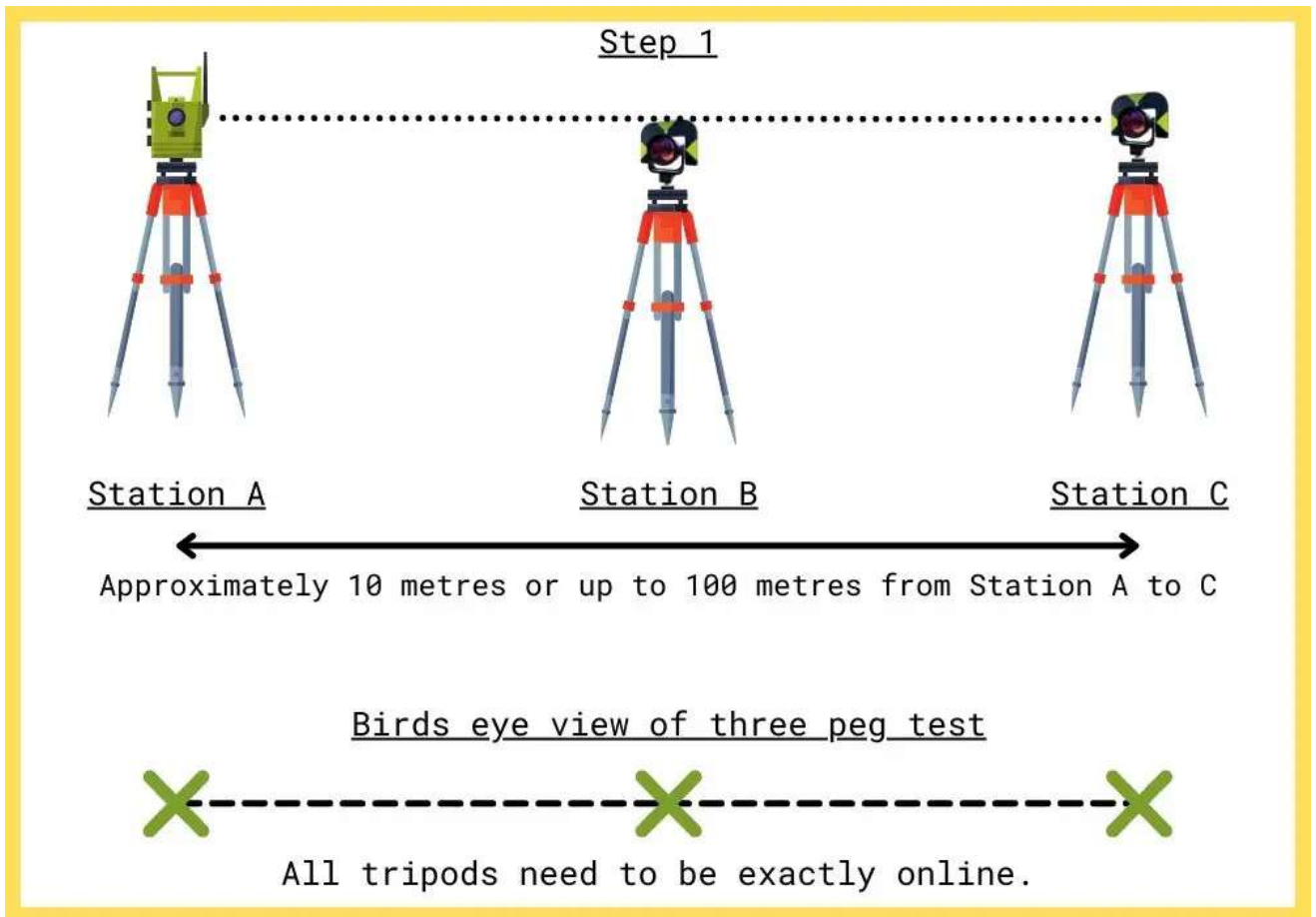
- 3 x tripods
- 3 x prism tribrachs
- 1 x prism
- 1 x surveying total station



Steps To Complete A Three Peg Test

Three peg test duration 30 minutes

## 1. Setup 3 Tripods On-Line

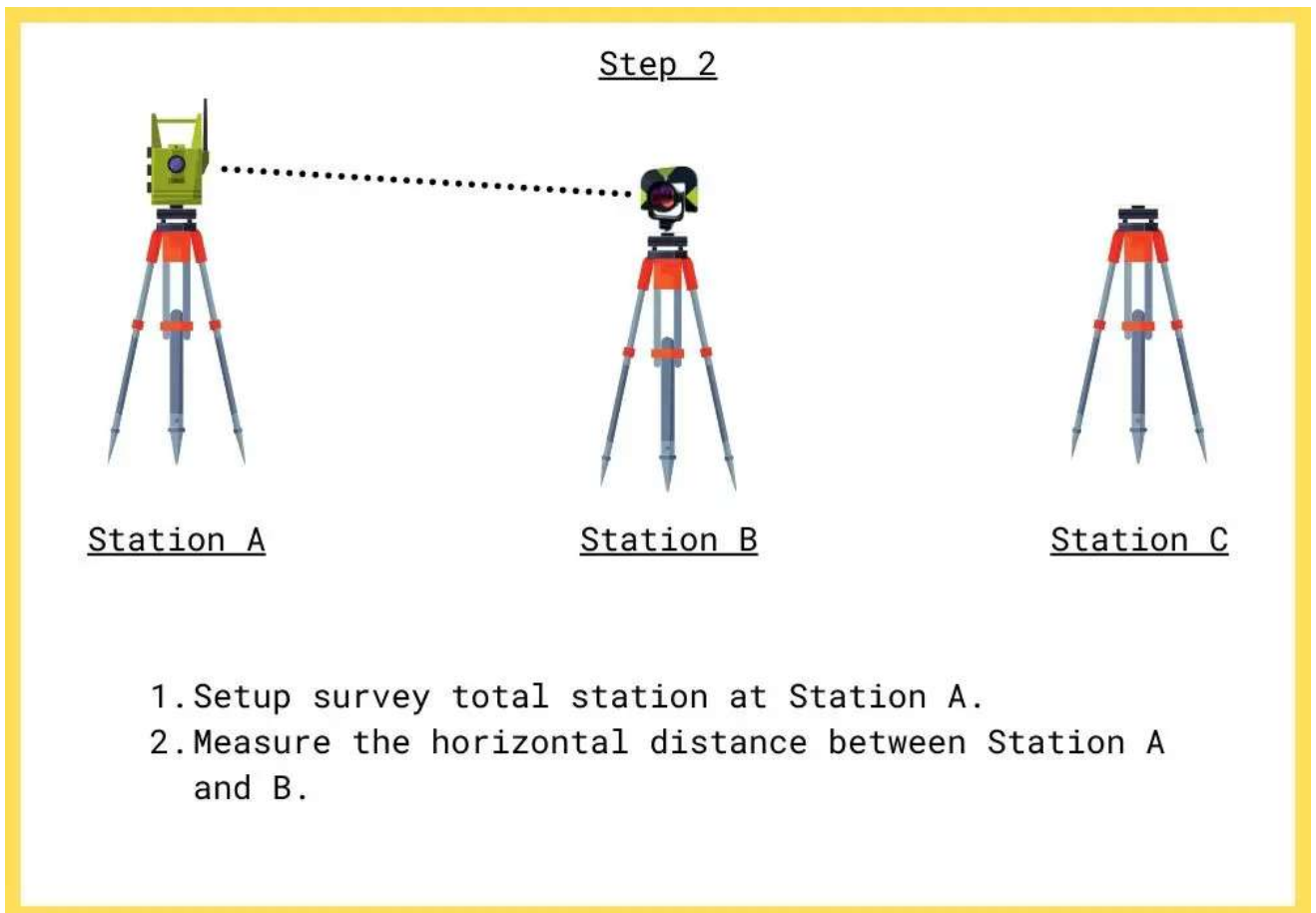


Setup 3 x tripods in a row (Station A, B and C). The distance between the target doesn't matter but best to add a bit of distance if you can, at least 10 metres.

To get all of the tripods online first set up a total station at Station A and a prism at Station C (level both setups). Then get your survey assistant to move a tripod (Station B) until it is online and levelled.

Setup the middle tripod (Station B) at a lower height than the first and last tripod (Station A and C), this is so your view won't be obstructed when measuring from Station A to C.

## 2. Setup Total Station At Station A



Setup the total station at Station A, and put a target on Station B.

Set the prism constant in the total station or controller to zero.

Measure the horizontal distance from A to B 10 times.

### 3. Move Prism From Station B to C

### Step 3



1. Move the prism from Station B to Station C (don't move any tribrachs).
2. Measure the horizontal distance between Station A and C.

Move the prism from Station B to Station C and measure the horizontal distance A to C 10 times.

Now measure the horizontal distance from A to C 10 times.

## 4. Move Total Station From Station A to B

#### Step 4



- Move the total station from Station A to B.
- Measure the horizontal distance between Station B and C.

Now move the total station from Station A to B.

Measure the horizontal distance from Station B to C 10 times.

## 5. Calculate Measured Prism Constant

$$PC = AC - (AB + BC)$$

- PC stands for prism constant.
- Distances between stations are horizontal distances and the average of 10 observations with any outliers removed.
- If the prism constant in the total station has been set to zero, the result will be the measured prism constant.

Full Formula

$$AC + PC = (AB + PC + BC + PC)$$

$$\text{Therefore } PC = AC - (AB + BC)$$

The first step is to calculate the average of each of the three horizontal distance observations.

The prism constant (PC) = AC – (AB + BC). The resulting number will be the observed prism constant of that prism.

Before considering changing what prism constant is used, consider the measurement accuracy of your total station and see if it has been measured with the manufacturers' specifications.

View the manufacturer's stated prism constant of the below prisms.

[Leica Prism Constants](#)

[Trimble Prism Constants](#)



# Three Peg Test FAQs

## What Is the Formula to Calculate the Prism Constant of A Prism

The formula to use after the fieldwork is  $PC = AC - (AB + BC)$ .

Read the blog above to learn how to do a three peg test if you are not sure.

## How Do You Find the Constant of A Prism

To measure and calculate the prism constant of a prism, you can do a **three peg test** which is detailed above in this blog.

George Mylne

### ABOUT THE AUTHOR

George has been a surveyor for over 13 years, working across a wide range of projects and industries. In this blog, he shares his experiences and information gathered from his time on mining, civil and surveying projects.

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