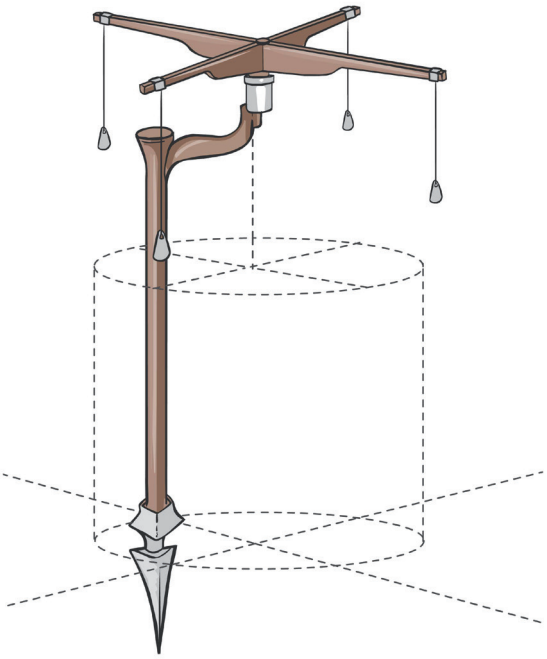
The groma

Two learned Roman engineers, Marcus Vitruvius Pollio, and Sextus Julius Frontinus, wrote about surveying practices in the Roman Empire at the time of Christ. In his writings, Vitruvius describes a device fixed to the wheels of a chariot used for measuring distances. Sextus Julius Frontinus made clear the distinctions between the Roman '*agrimensores*', who measured fields, and the '*gromatici*', who used a '*groma*', an aligning instrument that was used for laying out straight lines and right angles.

The *groma* consisted of a vertical iron staff ('*ferramentum*' in Latin) about 152 cm long, pointed at the lower end to be fixed in the ground, with a cross arm 25.3 cm long, pivoted at the top, which supported the main aligning element – the revolving star ('*stelleta*' in Latin) with arms across holding plumb lines at the ends.

Because its function was limited to sighting and setting out straight lines and right angles, its use was restricted to surveying roads and to establishing the rectangular grids of towns, military forts and, above all, land divisions.

Metal parts of many '*gromae*', as well as rods and other equipment were discovered in the ruined layers of Pompeii, confirming Frontinus' description. An examination of Roman roads, aqueducts, canals, buildings, city layouts, and land subdivisions shows their incomparable proficiency in the use of surveying instruments which seem extremely simple by modern-day standards.



A groma

Simulation of the user of a groma

1 Read the text and answer the questions.

1. Who were Marcus Vitruvius Pollio, and Sextus Julius Frontinus?
2. What did Marcus Vitruvius Pollio write about?
3. What concept did Sextus Julius Frontinus make clear?
4. What was a *groma*?
5. What did a *groma* consist of?
6. What was it used for?
7. Where were many *gromae* and other surveying tools found?
8. What did those archeological finds confirm?
9. What does an examination of Roman public works show?