

What are tests for?

This Kibbitzer is based on a dissertation by a Farsi-speaking postgraduate student of Civil Engineering:

Original	Revision
The purpose of this group of tests was to investigate the engineering behaviour of calcareous soil and to prove that this soil is not suitable for reuse in road construction	The purpose of this group of tests was to investigate the engineering behaviour of calcareous soil and to establish whether this soil is suitable for reuse in road construction

The first problem here is the use of the word **prove**. In science, a mathematician may prove a theorem:

1. Often, the best way to **prove a mathematical theorem** is to start at both ends, and try to meet in the middle.

However, the conclusions of science and engineering cannot usually be proved in the way in which a mathematician can prove that $1 + 1 = 2$. For that reason, **prove** is often negative in referring to science tests:

2. That both the CO₂ and global temperature data have positive slopes **does not prove that** the two series are related.
3. The stability of xyl⁺ recombinants from mut⁺ and mutU crosses **does not prove that** gene replacement occurs ...
4. Immunofluorescence and mechanical studies **indicate, but do not prove, that** a myosin-dependent cytoskeletal contraction drives capping.
5. While the authors **cannot prove that** the cases who participated in this study were representative of all cases with respect of chilli pepper consumption, a bias would have to be very strong to explain the association observed.

The second, and more serious problem with the original text is that it misrepresents the place of the experiment in scientific research. Tests are carried out not to show that something is true (i.e. the result is known in advance of the test) but to find out whether something is true (i.e. the result is **not** known in advance). In discussing this, we hit upon the verb **establish** which is slightly more formal than 'find out', and found citations such as the following for **establish whether**:

6. Tests are under way to **establish whether** the meat is from illegally slaughtered whales.
7. Geologists use a range of evidence to **establish whether** a star is faint enough to be a brown dwarf.
8. This is important in **establishing whether** a star is faint enough to be a brown dwarf.
9. The immediate issue is to **establish whether** ME is a medical condition that entitles people to benefits associated with illness.

10. Labour is committed to proportional representation for European elections, once a referendum has **established whether** the electorate wants this system for the House of Commons.

Another verb which would have fitted equally well in this context is **determine**, as shown by the following citations for **determine whether**:

11. We conducted a survey to **determine whether** an education programme could change traditional practices and whether any change is sustained.
12. Further investigations are required to **determine whether** the transformation of this sensory information to final motor commands takes place at the level of the paralemniscal zone.
13. To **determine whether** T cells from the INS-I-E mice were clonally paralysed, we attempted to activate the I-E-specific T cells by receptor crossleasing.
14. The therapist must **determine whether** the patient feels able, with support, to tackle his present difficulties ...
15. The aim of the audit was to **determine whether** children with indications for neonatal BCG immunization had received the vaccine before attendance at routine six-week postnatal examination.