

compass and straight edge, four standard cases, and the condition that decides whether a triangle exists



The rules, and what must be shown

- only a compass and an ungraduated straight edge may be used to build the figure
- the ruler may be used to set the compass to a given length, but not to mark a point by measuring along a line
- a protractor is not allowed, so every angle must be built from arcs
- all construction arcs must be left showing, since they are the evidence the figure was constructed rather than drawn
- label each point as it is created, and write the steps beside the figure
- a rough sketch of the finished triangle drawn first tells you what you are aiming at and costs almost nothing

The four standard cases

SSS

three sides given. Draw the longest as the base, then swing an arc of each remaining length from an end. Where the arcs cross is the third vertex

SAS

two sides and the included angle. Draw one side, construct the angle at one end, cut off the second side along that arm, then join

ASA

two angles and the included side. Draw the side, construct one angle at each end, and the two arms meet at the third vertex

RHS

a right angle, the hypotenuse and one side. Draw the known side, erect the perpendicular at one end, then cut the hypotenuse off with an arc from the far end

these are the same four combinations that prove congruence, and that is not a coincidence: a set of data determines a unique triangle exactly when it is enough to prove two triangles congruent