K'Nex Rod Lengths

The official lengths of K'Nex rods are in some cases different from the actual lengths.

In this document, all lengths are in millimetres.

The lengths of the rods have a mathematical relationship. If a right-angled triangle has sides formed from two rods of length L, each side has a total length of L + 20, because the connectors add 10mm to each end.

Pythagoras' theorem states that the square of the length of the diagonal of a right-angle triangle is equal to the sum of the squares of the lengths of the sides.

The length of the rod which forms the diagonal is therefore the square root of $2(L + 20)^2$ with 20 deducted from the result.

The table below shows how the sums work.

Rod	Official Length	Actual Length	Length + 20	Squared	Doubled	Square Root	- 20
Green	16	17½	37½	1406¼	2812½	53	33
White	32	33	53	2809	5618	75	55
Blue	54	55	75	5625	11250	106	86
Yellow	86	86	106	11236	22472	150	130
Red	128	130	150	22500	45000	212	192
Grey	190	192					

As a further check, if two similar rods are joined by an orange 2-way connector (which extends the overall length by 20mm), the length of the combination is the length of the next-but-one rod in the sequence.

Combination	Total Length	Which is the Length of...
Green rod + Connector + Green Rod	17½ + 20 + 17½ = 55	A blue rod
White rod + Connector + White Rod	33 + 20 + 33 = 86	A yellow rod
Blue rod + Connector + Blue Rod	55 + 20 + 55 = 130	A red rod
Yellow rod + Connector + Yellow Rod	86 + 20 + 86 = 192	A grey rod

These sums do not work if the official lengths are used.