Rod Lengths (Non-flexible)

Before inventing models, it is very useful to know the exact lengths of the rods.

How are you going to create a length of exactly 491mm, say, with the fewest number of rods and connectors if you don't know how long the rods are? You could use trial and error, but if you know the lengths of pieces you can do it with pencil and paper (or a computer program). The choice is yours, but for purists like Ted it is very useful to know the *actual* lengths of K'Nex rods.

"Ah!" you say, "They're as stated in various websites which sell K'Nex spares."

"Er… No," says Ted. "The actual lengths are generally different from the stated ones!"

Here is a table which shows, for the most common (non-flexible) rods, the actual lengths in millimetres (if you don't believe Ted, get out your ruler!):

Rod Lengths (mm)		
Colour	**Stated Length**	**Actual Length**
Green	16	17¼
White	32	33
Blue	54	55
Yellow	86	86
Red	128	130
Grey	190	192

If a connector is added to the end of a rod, the distance from the end of the rod to the centre of the hole in the connector is 10mm. Therefore, if a connector is added to both ends of a rod, its length is effectively increased by 20mm.

The K'Nex lengths have been designed so that if two rods of equal length are connected at right angles, a rod will be available to form the diagonal.

It follows that if 20mm is added to each rod length, the squares of the successive lengths will approximately double (Pythagoras' theorem states that the sum of the squares of the two shorter sides of a right-angled triangle is equal to the square of the hypotenuse), as shown in the table below:

	Side of Triangle			Diagonal
Rod Length	**Rod Length + 20**	**(Rod Length + 20)^2**	**← Doubled**	**Square Root of ←**
17¼	37¼	1386	2772	53
33	53	2809	5618	75
55	75	5625	11250	106
86	106	11236	22472	150
130	150	22500	45000	212
192	212	44944		

If you reproduce this table using the official lengths, the sums don't quite work!