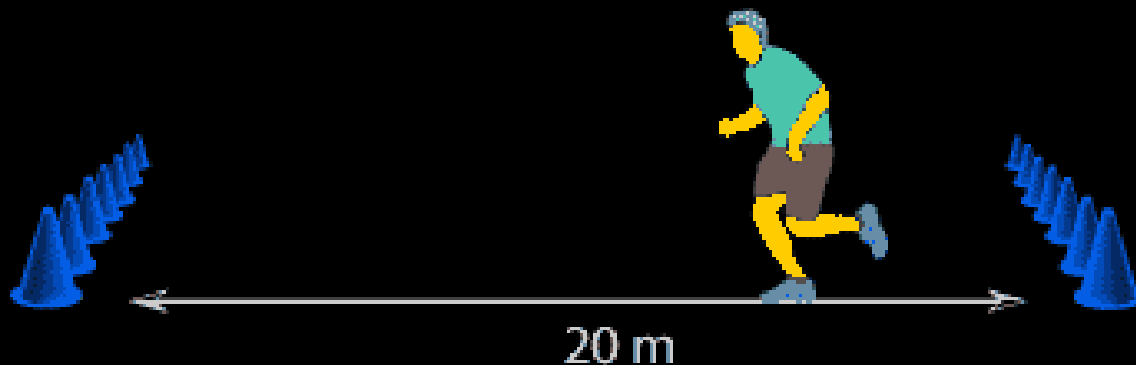


Homework

- Develop a Shuttle Run Test Software by using the Arduino



The Shuttle Run determines a person's maximum aerobic endurance. The test was first published by Leger and Lambert (1982).



Leger, L.A. & Lambert, J. (1982) "A maximal multistage 20m shuttle run test to predict VO₂ max", European Journal of Applied Physiology, Vol 49, p1-5.

Rules

The test involves running continuously between two points that are 20 m apart. These runs are synchronized with a pre-recorded audio tape or CD, which plays beeps at set intervals. As the test proceeds, the interval between each successive beep reduces, forcing the athlete to increase velocity over the course of the test, until it is impossible to keep in sync with the recording.

The recording is typically structured into 23 'levels', each of which lasts around 63 seconds (the shortest level is level 16, lasting 60.45 seconds, the longest is level 2, lasting 67.8 seconds). Usually, the interval of beeps is calculated as requiring a speed at the start of 8.0 km/h, increasing by 0.5 km/h with each level. The progression from one level to the next is signaled by 3 rapid beeps. The highest level attained before failing to keep up is recorded as the score for that test.



Level	Shuttles	Speed (km/h)	Seconds per shuttle	Total level time (s)	Distance (m)	Cumulative Distance (m)	Cumulative Time (min and seconds)
1	7	8	9	63	140	140	1:03
2	8	8.5	8.47	67.8	160	300	2:11
3	8	9	8	64	160	460	3:15
4	9	9.5	7.58	60.64	160	620	4:15
5	10	10	7.2	64.8	180	800	5:20
6	10	10.5	6.86	61.74	180	980	6:22
7	10	11	6.55	65.5	200	1180	7:27
8	10	11.5	6.26	62.6	200	1380	8:30
9	11	12	6	66	220	1600	9:36
10	11	12.5	5.76	63.36	220	1820	10:39
11	11	13	5.54	60.94	220	2040	11:40
12	12	13.5	5.33	63.96	240	2280	12:44
13	12	14	5.14	61.68	240	2520	13:46
14	13	14.5	4.97	64.61	260	2780	14:51
15	13	15	4.8	62.4	260	3040	15:53
16	13	15.5	4.65	60.45	260	3300	16:53
17	14	16	4.5	63	280	3580	17:56
18	14	16.5	4.36	61.04	280	3860	18:57
19	15	17	4.24	63.6	300	4160	20:00
20	15	17.5	4.11	61.65	300	4460	21:02
21	16	18	4	64	320	4780	22:06

The multi-stage fitness test incurs a total distance of 4780 metres in a time of twenty two minutes and six seconds (22:06).