# CALCULATING VO2 MAX FROM A SHUTTLE TEST

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# CALCULATING VO2 MAX FROM A SHUTTLE TEST

## WOMEN

| AGE | LOW BEEP TEST | LOW VO2 | BELOW AVERAGE BEEP TEST | BELOW AVERAGE VO2 | ABOVE AVERAGE BEEP TEST | ABOVE AVERAGE VO2 | HIGH BEEP TEST | HIGH VO2 | ELITE BEEP TEST | ELITE VO2 MAX |
|---|---|---|---|---|---|---|---|---|---|---|
| 18–19 | 6.6 | <35.0 | 6.7–7.6 | 35–38.5 | 7.7–9.6 | 38.85–45.15 | 9.7–11.7 | 45.5–52.15 | 11.8 | ≥52.5 |
| 20–29 | 4.5 | <28.0 | 4.6–6.5 | 28–34.65 | 6.6–7.10 | 35–39.9 | 8.1–10.9 | 40.25–49.7 | 10.10 | ≥50.05 |
| 30–39 | 4.2 | <26.95 | 4.3–5.8 | 26.95–32.55 | 5.9–7.4 | 32.9–37.8 | 7.5–10.3 | 38.15–47.6 | 10.4 | ≥47.95 |
| 40–49 | 3.8 | <25.9 | 3.9–5.4 | 25.9–31.15 | 5.5–6.9 | 31.5–36.05 | 6.10–9.9 | 36.4–46.2 | 9.10 | ≥46.55 |
| 50–59 | 3.5 | <24.5 | 3.6–4.5 | 24.5–28 | 4.6–6.5 | 28.35–34.65 | 6.6–9.6 | 35–45.15 | 9.7 | ≥45.5 |
| 60–69 | 2.4 | <21.0 | 2.5–3.4 | 21–24.15 | 3.5–4.9 | 24.5–29.4 | 5.1–7.6 | 29.75–38.5 | 7.7 | ≥38.85 |
| 70–79 | 1.4 | <17.5 | 1.5–2.3 | 17.5–20.65 | 2.4–3.4 | 21–24.15 | 3.5–6.5 | 24.5–34.65 | 6.6 | ≥35.0 |
| ≥80 | 1.1 | <15.4 | 1.2–1.7 | 15.4–18.9 | 1.8–2.6 | 19.25–21.7 | 2.7–4.8 | 22.05–29.05 | 4.9 | ≥29.4 |

## MEN

| AGE | LOW BEEP TEST | LOW VO2 | BELOW AVERAGE BEEP TEST | BELOW AVERAGE VO2 | ABOVE AVERAGE BEEP TEST | ABOVE AVERAGE VO2 | HIGH BEEP TEST | HIGH VO2 | ELITE BEEP TEST | ELITE VO2 MAX |
|---|---|---|---|---|---|---|---|---|---|---|
| 18–19 | 7.4 | <37.8 | 7.5–9.6 | 37.8–45.15 | 9.7–10.6 | 45.5–48.65 | 10.7–12.11 | 49–56.7 | 12.12 | ≥57.05 |
| 20–29 | 6.9 | <36.05 | 7.0–8.6 | 36.05–41.65 | 8.7–10.3 | 42–47.6 | 10.4–12.3 | 47.95–54.6 | 12.4 | ≥54.95 |
| 30–39 | 6.6 | <35.0 | 6.7–7.7 | 35–38.85 | 7.8–9.6 | 39.2–45.15 | 9.7–11.7 | 45.5–52.15 | 11.8 | ≥52.5 |
| 40–49 | 6.4 | <34.3 | 6.5–7.5 | 34.3–38.15 | 7.6–8.11 | 38.5–43.4 | 9.1–11.3 | 43.75–51.1 | 11.4 | ≥51.45 |
| 50–59 | 4.7 | <28.7 | 4.8–6.5 | 28.7–34.65 | 6.6–7.9 | 35–39.55 | 7.10–10.6 | 39.9–48.65 | 10.7 | ≥49.0 |
| 60–69 | 3.5 | <24.5 | 3.6–4.9 | 24.5–29.4 | 5.1–6.5 | 29.75–34.65 | 6.6–9.6 | 35–45.15 | 9.7 | ≥45.5 |
| 70–79 | 2.4 | <21.0 | 2.5–3.4 | 21–24.15 | 3.5–4.9 | 24.5–29.4 | 5.1–7.10 | 29.75–39.9 | 8.1 | ≥40.25 |
| ≥80 | 1.5 | <17.85 | 1.6–2.6 | 17.85–21.7 | 2.7–3.6 | 22.05–25.2 | 3.7–6.5 | 25.55–34.65 | 6.6 | ≥35.0 |

- There is a stepwise reduction in the risk of premature death as you move from low to below-average, to above-average, to high, and to elite cardiorespiratory fitness.
- Going from no cardiovascular exercise to 150 minutes of zone 2 training per week will halve the average person's risk of premature death and take them from the lowest fitness group to above average (moderately fit). For the average 60-year-old, this means achieving a VO2 max of about 30 ml/kg/min.
- Achieving a high or elite VO2 max will require a combination of zone 2 and zone 5 training for most individuals. This will reduce the average person's risk of premature death by 4-5 times.
- The correlation between the beep test and VO2 max is 0.92. This represents a strong correlation.

## References

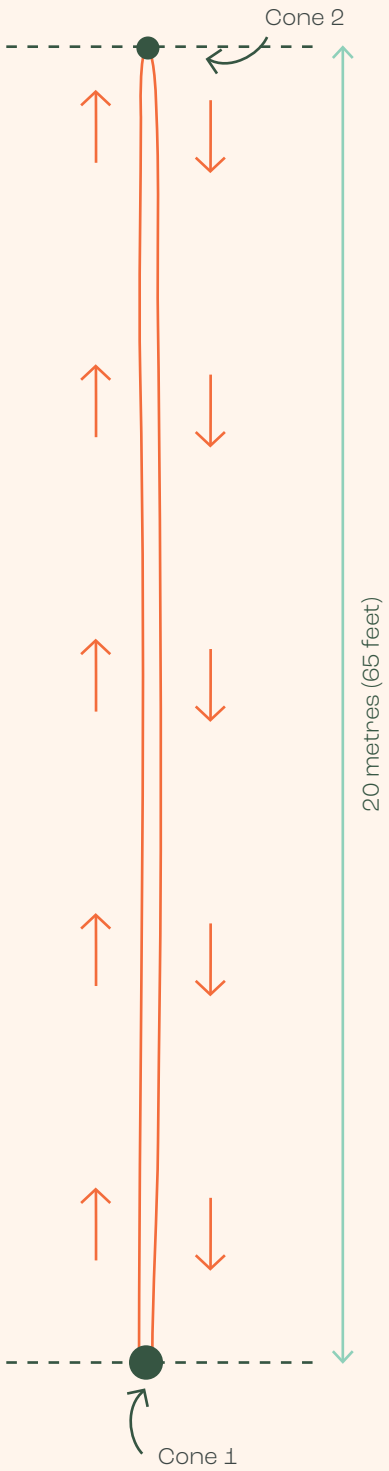

Association of Cardiorespiratory Fitness With Long-term Mortality Among Adults Undergoing Exercise Treadmill Testing. PMID: 30646252

Cardiorespiratory Fitness and Mortality Risk Across the Spectra of Age, Race, and Sex. PMID: 35926933

Shuttle Test

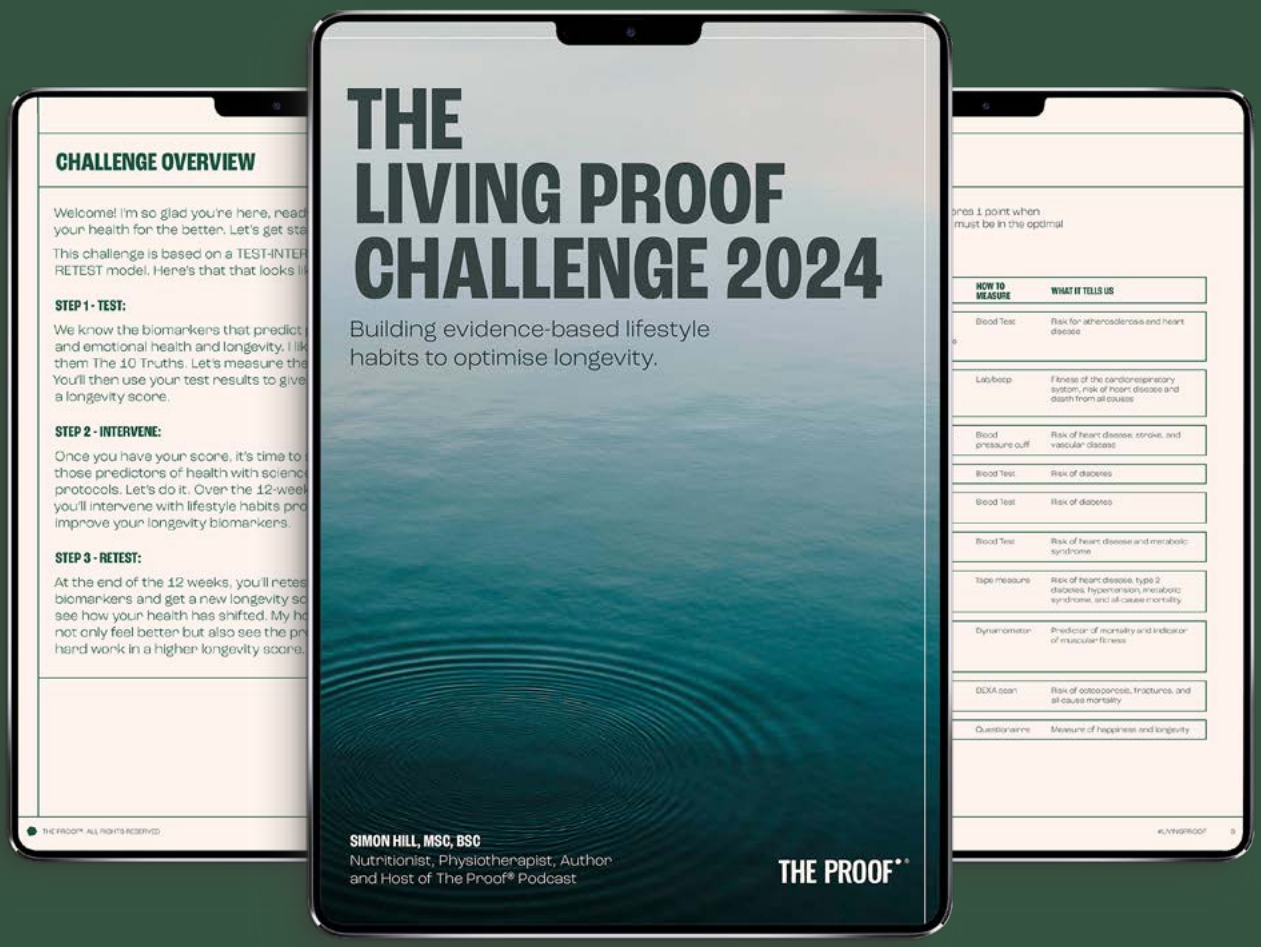
# The beep test is a maximal test involving continuous running between two lines 20m apart in time to recorded beeps.

1. Choose a flat and smooth surface, such as a field or a gymnasium, to conduct the beep test.
2. Place two cones or markers 20 metres (65 feet) apart to mark the running distance.
3. To conduct the test, you will need an audio file or an app that provides the beep signals at specific intervals. These beeps indicate when to start running and when to reach the opposite cone. We recommend downloading a 'beep test' mobile app that offers the '20m beep test' or 'shuttle test'. You might want to connect your phone to a speaker to ensure you can hear the signals.
4. Before starting the test, warm up with light exercises and stretching to prevent injuries.
5. Stand behind the starting cone. When the first beep sounds, start running towards the opposite cone. The goal is to reach the cone before the next beep.
6. The beep test follows a progressive pattern where the time between beeps gradually decreases. As the test progresses, the running speed increases, becoming more challenging. If the line is reached before the beep, the subject waits for the beep before continuing. If the line is not reached before the beep, the subject gets a warning and must run to the line, turn, and try to catch up with the pace within two more beeps. The subject receives a warning the first time they fail to reach the line (within 2 metres), and is eliminated after the second warning.
7. The test is complete when you are unable to keep up with the beeps or complete the required number of shuttles. The last completed shuttle determines your fitness level. Record your result.
8. Use the beep test conversion chart above to convert the recorded level and shuttle number into a VO2 max score, an estimate of cardiovascular fitness.
9. Cool Down: After the test, ensure to do a cool-down routine to gradually lower your heart rate and stretch your muscles.




Remember, the beep test can be physically demanding, so it's essential to pace yourself and stop if you feel any serious pain beyond general fatigue from exertion.

Best of luck!

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