



Body Composition & Anthropometrics

Metric	Formula	Notes
Body Mass Index (BMI)	$\text{weight (kg)} \div [\text{height (m)}]^2$	Screening tool; doesn't distinguish muscle vs. fat mass
Waist-to-Hip Ratio (WHR)	$\text{waist (cm)} \div \text{hip (cm)}$	>0.90 (men) or >0.85 (women) indicates higher health risk
Skinfold (3-Site) Body Fat %	Men: $BD = 1.10938 - 0.0008267 \cdot \Sigma SF + 0.0000016 \cdot (\Sigma SF)^2 - 0.0002574 \cdot \text{Age}$; %BF = $(495 \div BD) - 450$	Sites (men): chest, abdomen, thigh; (women): triceps, suprailiac, thigh; use calipers (mm)

Cardiovascular Training Calculations

Calculation	Formula	Example (age 30, resting 60 bpm)
Max HR (Fox)	$220 - \text{age}$	190 bpm
Max HR (Tanaka)	$208 - (0.7 \times \text{age})$	≈187 bpm
Heart Rate Reserve (HRR)	$\text{HR}_{\text{max}} - \text{HR}_{\text{rest}}$	130 bpm
Target HR (Karvonen)	$\text{HR}_{\text{rest}} + (\text{Intensity}\% \times \text{HRR})$	138 bpm at 60%
VO₂max (Cooper Test)	$(\text{Distance(m)} - 504.9) \div 44.73$	42.2 ml·kg ⁻¹ ·min ⁻¹

Heart Rate Training Zones

Zone	%HRR	Purpose
Recovery	30-39%	Active recovery, warm-up
Light	40-49%	Health, recovery
Moderate	50-59%	Aerobic base, fat burn
Hard	60-79%	Endurance, performance gain
Very Hard	80-89%	Anaerobic threshold training



Strength Assessment & Training Load

Calculation	Formula	Notes
1RM (Epley)	$\text{weight} \times (1 + \text{reps} \div 30)$	Best for ≤ 10 reps
1RM (Brzycki)	$\text{weight} \div (1.0278 - 0.0278 \times \text{reps})$	
Volume Load	$\text{sets} \times \text{reps} \times \text{weight}$	Total work per session
Intensity Zones (1RM%)	<67% Endurance; 67–85% Hypertrophy; >85% Strength	Guide rep ranges

1RM Prediction Formulas

Formula	Equation	Use Case
Lombardi	$\text{weight} \times \text{reps}^{0.10}$	High-rep estimates
Mayhew	$(100 \times \text{weight}) \div (52.2 + 41.9e^{(-0.055 \times \text{reps})})$	Alternative for varied reps

Program Design Guidelines (FITT & Periodization)

Principle	Details
Frequency	2–3d/wk novice; 4–6d/wk intermediate/advanced
Intensity	See HR Training Zones
Time	Resistance: 30–60min; Aerobic: 20–60min
Type	Multi-joint first, then single-joint; combine cardio & strength

Exercise Prescription Tables

Goal	Rep Range	%1RM	Rest Interval
Strength	1–5	85–100%	2–5min
Hypertrophy	6–12	67–85%	30–90s
Endurance	12–20+	<67%	<30s
Power	1–5	30–60% explosive	2–5min



Flexibility & Mobility Protocols

Type of Stretching	Description	When to Use
Dynamic	Active movements through full ROM	Pre-session warm-up
Static	Passive hold 15–60s	Post-session cool-down
PNF (Contract-Relax)	Contract → relax → deepen stretch	Flexibility sessions

Session Structure Template

Time (min)	Segment	Tips
5–10	General Warm-Up	Light cardio; cue quality
5–10	Dynamic Mobility	Leg swings, arm circles
5	Activation	Glute bridges, banded steps
20–40	Resistance Training	Follow order; track volume
5–10	Accessory & Core	Target weak points
5–10	Cool-Down & Stretch	Static stretches; foam roll
2	Review & Homework	Recap; assign plan

Conversion	Factor
1 kg → lb	×2.2046
1 lb → kg	÷2.2046
1 in → cm	×2.54
1 cm → in	÷2.54

Unit Conversions