

THE COMPLETE GUIDE · TRAINING INTENSITY

RATE OF PERCEIVED EXERTION

One effort scale for every session: swim, bike, run and the gym. What RPE is, why it often beats heart rate, and how to tie it to your own numbers.

12 PAGES · SWIM · BIKE · RUN · STRENGTH · FILL-IN SHEETS

THE SHORT VERSION

HOW HARD DOES IT FEEL?

RPE is a self-rating of how hard an effort feels right now, on a fixed numbered scale. It turns your breathing, the burn in your muscles and how much is left in the tank into one number a coach can programme against.

Heart rate and pace tell you what your body is doing. RPE tells you what it is costing you today. After a bad night, a work trip or a heavy week, the same pace feels harder. RPE moves with you, so the session still lands where it was meant to.

TWO SCALES YOU WILL SEE

THE ORIGINAL BORG SCALE, 6 TO 20

Built so the number roughly tracked heart rate in a fit young adult: multiply by ten, so RPE 13 is around 130 bpm. That link only holds for some people, and the odd range is a historical quirk, so most coaches have moved on.

THE MODERN 0 TO 10 SCALE (CR10)

Zero is nothing at all, ten is maximal. Simple to use, and it powers **session RPE**, one of the best-validated, lowest-tech ways to measure training load (page 11).

This guide uses 1 to 10 as the common language for every sport. The ladder on the next page defines each number, and every sport table later maps back to it.

THE SCALE

THE ONE TO TEN LADDER

A 10 means genuinely nothing left. A 7 is comfortably hard: sustainable, but you would not want to hold a conversation.

RPE	EFFORT	TALK TEST	IN THE GYM
1	**Very easy** Recovery	You could sing	Not used
2–3	**Easy** Aerobic base, all day	Full conversation	Warm-up sets
4	**Moderate** Steady	Comfortable sentences	5 or more reps in reserve
5–6	**Somewhat hard** Tempo	Short sentences	4 reps in reserve
7	**Hard** Threshold	A few words only	3 reps in reserve
8	**Very hard** VO2 max intervals	A word or two	2 reps in reserve
9	**Extremely hard** Near max	Cannot talk	1 rep in reserve
10	**Maximal** All out	Silent	0 in reserve: failure

RATE THE WORK, NOT THE MOMENT

Score how the effort feels a minute or two in, once your breathing has settled into it, not the first ten seconds. In the gym, rate the set at the last rep.

WHY IT WORKS

SIX REASONS TO USE RPE

IT IS ALWAYS THERE, AND IT IS FREE

No strap, watch or power meter. Every athlete has it in every session, including the pool, where devices struggle.

IT IS INSTANT

You feel effort the moment you change pace. There is no lag to wait out, unlike heart rate.

IT TAKES EVERYTHING INTO ACCOUNT

Heat, poor sleep, stress, yesterday's session, a cold coming on: all of it shows up in how hard a pace feels. On a rough day, holding RPE 7 dials the pace or weight back to what you can handle today, which is usually exactly what the session intends.

IT WORKS IN EVERY SPORT

One scale covers easy swims, threshold bike intervals, VO2 max running reps and heavy squats. Heart rate, pace and power each only fit some of them.

IT IS BACKED BY RESEARCH

RPE tracks physiological intensity well: it lines up with %VO2 max and blood lactate in endurance work, and in the gym, studies report RPE-to-%1RM correlations of about 0.88 to 0.91.

IT TEACHES PACING

Learning what each number feels like is the skill that wins races and stops blow-ups.

The honest limitation. RPE is subjective and takes practice; beginners often under-rate hard efforts. The fix is to anchor it to a measured benchmark for each sport (CSS, FTP, threshold pace, your 1RM), so the number means the same thing every time. A felt number tied to a measured one is the whole game, and it is what pages 6 to 10 set up.

RPE VERSUS HEART RATE

WHERE HEART RATE FALLS SHORT

Heart rate is useful for steady aerobic work, but it has real blind spots that RPE does not.

IT LAGS

It takes 30 seconds to two minutes or more to catch up with a change in effort. On short reps, sprints, hills and lifting sets, the effort is over before heart rate shows it.

IT FLATTENS AT THE TOP

Threshold, VO2 max and all-out efforts can all sit within a few beats of your maximum, so heart rate cannot tell your most important hard zones apart. RPE can: 7, 8 and 10 feel very different.

IT DRIFTS

On long efforts it creeps up at the same pace as you heat up and lose fluid, often 5 to 10% in an hour. Follow it and you slow down for no reason.

OTHER THINGS MOVE IT

Heat, dehydration, caffeine, poor sleep, stress, altitude and illness all push it up or down, whatever you are actually doing.

IT BARELY REGISTERS STRENGTH WORK

A heavy triple is a maximal effort but may hardly nudge heart rate. In the gym, reps in reserve and %1RM are the right tools.

IT STRUGGLES IN WATER

Wrist sensors are unreliable when wet, and the dive reflex lowers swimming heart rate by roughly 5 to 10 bpm, so land zones do not transfer to the pool.

THE ZONES ARE OFTEN WRONG TO START WITH

220 minus your age can be 10 to 12 beats out either way, and every zone built on it carries that error.

The bottom line. Use heart rate as supporting evidence on steady aerobic sessions if you like. Drive the intensity with RPE, anchored to the benchmarks that follow.

SWIMMING · ANCHORED TO CSS

RPE IN THE POOL

Your benchmark is **Critical Swim Speed (CSS)**: your sustainable threshold pace, worked out from an all-out 400 m and an all-out 200 m. It is roughly the pace you could hold for a 1500 m time trial.

CSS speed = 200 ÷ (T400 − T200)

Times in seconds gives metres per second; most swimmers turn it into a pace per 100 m. Our free CSS calculator does it for you.

ZONE	NAME	% OF CSS SPEED	RPE	USE IT FOR
1	Recovery, technique	77–87%	1–3	Easy, form-focused
2	Aerobic endurance	87–95%	3–4	Steady volume and economy
3	Moderate, steady	95–98%	5–6	Controlled aerobic work
4	Threshold	98–104%	7	The main CSS sets
5	VO2 max, race	Above 104%	8–10	Fast reps, full rest

SPEED TO PACE

Pace = CSS pace ÷ the percentage. A CSS of 1:40 per 100 m gives Zone 1 at 1:55 to 2:10, Zone 2 at 1:46 to 1:54, Zone 3 at 1:43 to 1:45, threshold at 1:37 to 1:42, and Zone 5 faster than 1:36.

MY CSS PACE _____ per 100 m **TESTED ON** _____

CYCLING · ANCHORED TO FTP

RPE ON THE BIKE

Your benchmark is **Functional Threshold Power (FTP)**: the most power you can hold for roughly an hour, usually estimated as about 95% of a 20-minute test. Power is objective and has no lag, so the bike is the easiest place to learn RPE. Find yours with our free FTP calculator.

ZONE	NAME	% OF FTP	RPE	FEEL
1	**Active recovery**	Under 55%	1–2	Very easy spinning
2	**Endurance**	56–75%	2–4	All-day base pace
3	**Tempo**	76–90%	5–6	Spirited, steady effort
4	**Threshold**	91–105%	7	Comfortably hard, around a one-hour effort
5	**VO2 max**	106–120%	8–9	3 to 8 minute intervals
6	**Anaerobic**	121–150%	9–10	30 seconds to 3 minutes, severe
7	**Neuromuscular**	Max	10	Very short sprints and jumps

Zones follow Andrew Coggan's seven-level power model, with this guide's RPE alongside.

WORKED EXAMPLE

An FTP of 250 W gives endurance at about 140 to 188 W (RPE 2 to 4), threshold at about 228 to 263 W (RPE 7), and VO2 max at about 265 to 300 W (RPE 8 to 9).

MY FTP _____ watts **TESTED ON** _____

RUNNING · ANCHORED TO THRESHOLD PACE

RPE ON THE RUN

Your benchmark is **threshold pace**: the pace you could hold for roughly an hour, the running equivalent of FTP. Zones are set as a percentage of threshold speed, so 100% is threshold pace. Our free pace calculator converts paces and splits.

ZONE	NAME	% THRESHOLD	% VO2 MAX	RPE	USE IT FOR
1	Easy	74–84%	59–74%	2–4	Aerobic base, fully conversational
2	Marathon	85–95%	75–84%	4–5	Steady, short sentences
3	Threshold, tempo	96–102%	83–88%	6–7	Comfortably hard
4	Interval	103–115%	95–100%	8–9	Raises VO2 max, 3 to 5 minute reps
5	Repetition	Over 115%	Above max	10	Speed and economy

Names follow Jack Daniels' training paces. The percentages are coaching bands; your own physiology shifts them.

WORKED EXAMPLE

A threshold pace of 4:30 per km gives easy running at about 5:20 to 6:05 per km, tempo at about 4:25 to 4:41, and VO2 max reps at about 3:55 to 4:22. Your aerobic threshold sits in the easy-to-steady range, where you can still talk freely.

MY THRESHOLD PACE _____ per km / mile **TESTED ON** _____

STRENGTH · ANCHORED TO REPS IN RESERVE

RPE IN THE GYM

Strength is where RPE shines and heart rate fails completely. In the gym, the scale is defined by how many reps you had left.

Reps in reserve (RIR) is how many more reps you could have done before you could not complete another with good form. Finish a set feeling you had two more in you: that is 2 RIR. It adjusts to how strong you are today, which is what makes it so useful.

RPE	REPS IN RESERVE	WHAT IT MEANS
10	0	True failure, nothing left
9.5	0–1	Maybe a tiny bit more
9	1	One rep left
8	2	Two reps left
7	3	Three reps left
5–6	4–6	Clearly short of your limit, warm-up feel

RPE = 10 − RIR. "RPE 8" and "2 RIR" are the same instruction. A coach can write "3 × 5 at RPE 8" and the load sorts itself out on the day.

MOST SETS SHOULD NOT GO TO FAILURE

For most people, most working sets belong at RPE 7 to 9: close enough to the limit to drive strength, far enough from it to recover and keep good form. Save true RPE 10 for the odd test or last set.

STRENGTH · FROM RPE TO THE BAR

RPE TO %1RM

Your **1RM** is the most weight you can lift once. Because effort, reps and load are linked, an RPE at a given number of reps points to a predictable percentage of your 1RM. This is the widely used chart from Eric Helms and colleagues.

REPS	RPE 10	RPE 9	RPE 8	RPE 7	RPE 6
1	100%	97.8%	95.5%	92.4%	89.2%
2	95.5%	93.9%	92.2%	90.7%	88.1%
3	92.2%	90.7%	89.0%	87.4%	85.0%
5	86.3%	85.0%	**83.3%**	81.1%	78.6%
8	78.6%	77.4%	75.5%	73.9%	70.7%
10	73.9%	72.3%	70.5%	68.0%	65.3%

READING IT

"5 reps at RPE 8" is about 83% of your 1RM, with roughly two reps left in the tank. With a 1RM of 100 kg, that is about 83 kg. Your 3RM, the most you can lift three times, sits at about 92% of 1RM.

MY LIFTS

Squat 1RM _____ Bench 1RM _____

Deadlift 1RM _____ Other _____

SESSION RPE AND TRAINING LOAD

MEASURE YOUR WEEK

Rate the whole session from 0 to 10 about half an hour after you finish, then multiply by its length in minutes. That gives a load score you can add up across a week, whatever the sport.

Load = session RPE × minutes

DAY	SESSION	MINUTES	RPE	LOAD
MON	Easy run	45	3	135
TUE	Bike intervals	60	7	420
THU	Strength	50	6	300
SAT	Long ride	120	4	480
SUN	Easy swim	40	3	120
WEEK		315		1,455

TRACK THE TREND

Compare weeks, not days. Build gradually and avoid sudden big jumps in weekly load: that is where niggles and illness tend to come from.

WATCH THE MISMATCH

If the same session keeps scoring higher than it used to, you may be tired, under-recovered or unwell. That is your cue to back off.

Getting better at rating. Calibrate against known efforts: a threshold test or a set taken close to failure shows you what a 7, 8 or 10 really feels like. Then compare what you rated with your splits, power or loads. Within a few weeks the number gets sharp.

EFFORT IS DIRECTLY PROPORTIONAL TO THE RESULTS YOU GET.

LOU HOLTZ

WANT IT BUILT AROUND YOU?

I'm Tom, Head Coach at TC Coaching. RPE is a skill, and it sharpens fastest when someone is checking your numbers against real benchmarks. In **Project Legacy™** a team builds your training around your diary, your data and your goal: training from me, nutrition from Adam Glover, rehab from Gaz McNamara.

APPLY FOR COACHING

THE RPE TOOL

Educational information for healthy athletes, not medical advice. Zone and %1RM bands are approximate and vary between people. Build new intensities gradually.