

Chapter 10 · Training in Sports

CBSE Class 12 Physical Education (048) · Unit 10 = 9 marks · Ultimate Revision Sheet

60-SECOND RECALL

Strength methods	Isometric (no movement) · Isotonic (movement) · Isokinetic (constant speed, machine)
Endurance methods	Continuous · Interval · Fartlek
Speed methods	Acceleration runs · Pace runs
Flexibility methods	Ballistic · Dynamic · Static (active/passive) · PNF
Coordination	Ability to perform movements smoothly and accurately
Circuit training	8–12 stations , minimal rest, developed by Morgan and Adamson

1. Talent Identification and Talent Development

Term	Meaning
Talent Identification	The process of recognising individuals with the potential to excel in a particular sport, using physical, physiological and psychological testing.
Talent Development	Providing the right environment, coaching, facilities and support so that identified talent reaches its potential.

Criteria used: anthropometric measures (height, weight, limb length) · physical fitness components · physiological factors (VO_2 max, muscle fibre type) · psychological attributes · skill and game sense · heredity.

Indian talent programmes: Khelo India · Target Olympic Podium Scheme (TOPS) · SAI training centres · sports schools and academies.

Importance: avoids wastage of time and resources · enables early specialised training · improves the national standard of sport · ensures the right athlete goes into the right sport.

2. Sports Training Cycle — Micro, Meso, Macro

A sectional plan breaks the training year into phases, periods and weeks. The three training cycles are sectional plans built from the needs of the annual plan. The longest unit of all is the long-term plan (8–15 years), which runs from basic training to peak performance.

THE THREE CYCLES — DURATION IS THE MARK

Cycle	Duration	Purpose and detail
Micro Cycle	3 to 10 days (5–10 days for intermediate and high-performance athletes)	Shortest cycle. The last day gives active recovery and relaxation to prepare for the next micro cycle. Load proportions of high to medium/low: 1:1 (one high day then one medium), 2:1 (two high then one medium), 3:1 (three high then one medium or low).
Meso Cycle	3 to 6 weeks (4 weeks is considered best)	Medium duration. Tackles specific tasks: learning and mastering skills · maintaining and stabilising performance · developing physical and motor fitness · preparing for a specific competition · attaining optimal performance · preparing for the next mesocycle. 4 weeks is the minimum period in which significant physiological and psychological change occurs. The last week is a transitional phase for recovery.

Macro Cycle	3 to 12 months	Longest cycle. Enables the athlete to peak at a specific time during competition. A macro cycle is made up of several meso cycles ; the last meso cycle ensures recovery for a smooth transition into the next macro cycle.
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TRAP The durations are the marks — get them exact: **micro 3–10 DAYS, meso 3–6 WEEKS, macro 3–12 MONTHS**. Note the units change each time.

Remember the nesting direction: **a macro cycle contains meso cycles, which contain micro cycles** — not the other way round.

The three periods of the training year are **preparatory, competition and transitional**.

3. Strength — Methods of Development

DEFINITION Strength is the ability of a muscle or muscle group to **overcome or act against resistance**.

Types: **Maximum strength** (against maximum resistance) · **Explosive strength** (strength × speed, e.g. shot put) · **Strength endurance** (strength × endurance, e.g. long-distance swimming).

THE THREE METHODS — distinguished by MOVEMENT

Method	What happens	Examples
ISOMETRIC <i>iso = same, metric = length</i>	Muscle contracts but there is NO visible movement and no change in muscle length . Work is done but not seen.	Pushing against a wall · holding a plank · pressing palms together · holding a weight still
ISOTONIC <i>tonic = tension</i>	Muscle changes length and there IS visible movement . Tension stays roughly constant.	Weight training, push-ups, squats, running, most gym exercises
ISOKINETIC <i>kinetic = motion</i>	Contraction at a CONSTANT SPEED throughout the range, requiring special machines . Resistance varies to match the force applied.	Specialised isokinetic machines · rowing and swimming actions on such equipment

TRAP **Isometric = NO movement. Isotonic = movement. Isokinetic = constant SPEED and needs a machine.** The word roots give it away: *metric = length (unchanged), tonic = tension, kinetic = motion*.

4. Endurance — Methods of Development

DEFINITION Endurance is the ability to **resist fatigue** and sustain activity for a long period.

Types by duration: **Speed endurance** (up to 45 s) · **Short-term** (45 s – 2 min) · **Medium-term** (2 – 11 min) · **Long-term** (above 11 min). **By nature:** basic, general and specific endurance.

THE THREE METHODS

Method	How it works	Key point
CONTINUOUS	Exercise performed for a long duration without any rest , at a steady low-to-moderate intensity. Duration at least 30 minutes .	Develops aerobic capacity. Eg: long slow-distance running, cycling, swimming.

INTERVAL	Alternating periods of work and INCOMPLETE recovery . The athlete starts the next repetition before fully recovering (heart rate falls to about 120–130).	Develops both aerobic and anaerobic capacity. Eg: 8 × 400 m with 90 s recovery.
FARTLEK <i>Swedish for “speed play”</i>	Speed is varied by the athlete’s own feeling , over varied natural terrain — uphill, downhill, soft ground. No fixed intervals , no timing.	Developed in Sweden . Athlete decides the pace, so it is less monotonous. Develops aerobic and anaerobic capacity.

INTERVAL vs FARTLEK — the classic distinction *Interval is planned and measured — fixed distance, fixed recovery, timed, usually on a track.*
Fartlek is unplanned — the athlete varies the speed at will over natural terrain, with no stopwatch.

5. Speed — Methods of Development

DEFINITION *Speed is the ability to perform a movement or cover a distance in the **shortest possible time**. It is largely **genetically determined** (fast-twitch fibre percentage), so it is the hardest component to improve.*

Types: Reaction ability · Acceleration ability · Movement speed · Locomotor ability · Speed endurance.

THE TWO METHODS

Method	How it works
ACCELERATION RUNS	Used to develop explosive strength, acceleration ability and movement frequency . The athlete runs from a standing or crouch start, accelerating to maximum speed as quickly as possible , typically over 25–50 m. Adequate recovery between runs.
PACE RUNS / PACE RACES	Running the whole distance at a uniform, pre-decided speed . Used for distances of 800 m and above . Develops speed endurance and teaches even pace judgement.

6. Flexibility — Methods of Development

DEFINITION *Flexibility is the range of motion available at a joint or group of joints.*

Types: *Passive flexibility* (with external help — always greater) · **Active flexibility** (without help), which is further **static** (held in position) or **dynamic** (during movement).

THE FOUR METHODS

Method	How it works
BALLISTIC	Stretching performed with a swing, bounce or bobbing action using momentum. Effective but carries the highest injury risk ; should be done only after a thorough warm-up.
DYNAMIC	Controlled movement through the full range of motion, gradually increasing reach and speed. Safer than ballistic — no bouncing. Ideal in a warm-up. Eg: leg swings, arm circles.
STATIC	The stretch is taken to the end of range and HELD for 10–30 seconds without movement. Active static = held by your own muscles; Passive static = held with help from a partner or gravity. Safest method; best in a cool-down .

PNF

Proprioceptive
Neuromuscular Facilitation

A partner-assisted technique: the muscle is **stretched, then contracted isometrically against resistance, then relaxed and stretched further**. Usually the **most effective** method for increasing range, but needs a trained partner.

7. Coordinative Abilities

DEFINITION *Coordinative abilities are the abilities to perform a group of movements with smoothness, accuracy and control. They depend largely on the central nervous system.*

Ability	Meaning
Orientation ability	Determining and changing the position of the body in time and space — e.g. a goalkeeper tracking the ball
Coupling ability	Combining movements of different body parts into one smooth action — e.g. a basketball lay-up
Reaction ability	Reacting quickly and correctly to a signal — e.g. a sprint start
Balance ability	Maintaining equilibrium during and after movement — e.g. gymnastics beam
Rhythm ability	Perceiving and reproducing the rhythm of a movement — e.g. hurdling stride pattern
Adaptation ability	Changing or adjusting the movement when the situation changes unexpectedly — e.g. adjusting to a deflected ball
Differentiation ability	Achieving a fine adjustment of force and effort in a movement — e.g. a delicate drop shot in badminton

8. Circuit Training

CONCEPT *Circuit training was developed by R. E. Morgan and G. T. Adamson at the University of Leeds. The athlete moves through a series of 8 to 12 stations arranged in a circuit, performing a different exercise at each with little or no rest between stations.*

Advantages: develops several fitness components at once · large numbers can train in a small space · easily adapted to any age or level · little equipment needed · progress is easy to measure · not monotonous.

Design rule: arrange stations so that consecutive stations do not work the same muscle group — alternate upper body, lower body and core.

9. Question Triggers which method?

If the question says...	The answer is
"pushing against an immovable wall"	Isometric exercise
"weight training with visible movement"	Isotonic exercise
"constant speed on a special machine"	Isokinetic exercise
"running 30 minutes without rest"	Continuous method
"8 × 400 m with fixed 90 s recovery"	Interval method
"varied the pace at will over hills and forest"	Fartlek
"sprint 30 m from a crouch start, repeatedly"	Acceleration runs
"ran 800 m at a uniform planned speed"	Pace run

"bouncing while touching the toes"	Ballistic stretching
"held the stretch for 20 seconds"	Static stretching
"leg swings and arm circles in warm-up"	Dynamic stretching
"partner resisted, then stretched further"	PNF
"10 stations, no rest between"	Circuit training
"goalkeeper judging the ball's position in air"	Orientation ability
"adjusted the shot when the ball deflected"	Adaptation ability

MOST-ASKED BOARD QUESTIONS

1. **[5M]** Explain the methods of developing endurance / strength / flexibility.
2. **[5M]** Explain circuit training and its advantages.
3. **[3-5M]** Explain the coordinative abilities.
4. **[3M]** Differentiate between isometric, isotonic and isokinetic exercises.
5. **[3M]** Differentiate between interval training and fartlek training.
6. **[1M]** Who developed circuit training? → **Morgan and Adamson**
7. **[1M]** What does fartlek mean? → **Speed play** (Swedish)

THE HABIT THAT SCORES — Every method question wants the same three things: **name** → **how it works in one line** → **a concrete example**. For strength, remember the word roots — *metric* (length), *tonic* (tension), *kinetic* (motion) — and you can never confuse the three methods again.