Additional principles of training 5

It is important to add VARIATION to training routines to avoid boredom and maintain enjoyment.

Varying training routines

Minor changes in routine can produce large fitness gains. This change is known as variation.

Some basic things that could be done to ensure variation include changing the:

- type of equipment
- training environment
- order of training
- type of exercise
- nature of your training.

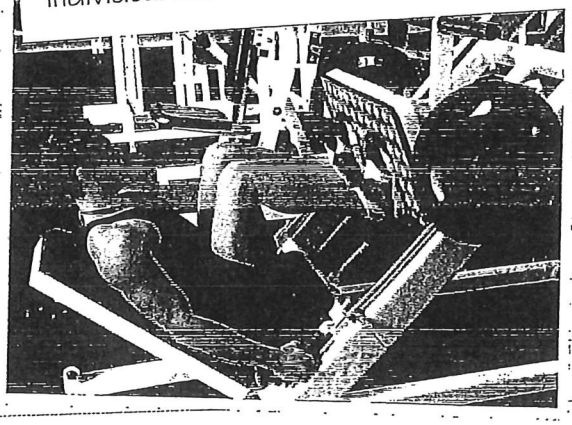
Why is variation important?

Variation is important because it helps to:

- ✓ keep you interested and maintain the motivation and enjoyment associated with training. If you are doing the same training all the time you are likely to become bored and so more likely to give up.
- ✓ provide new challenges for your body and reduces the risk of injuries caused by the repetition of the same actions and training methods.

Variation in practice

You still need to consider the specificity principle (see page 16) so that any variation is beneficial to the individual and their training goals.



An example of variation in practice is a footballer who uses both bounding ladder drills and weigh training to help build both leg power and strength. This will allow for recovery and adaptation to take place whilst maintaining enjoyment. This way he is more likely to persist with his training.

Worked example

Think about all the different training programmes before you answer this question.

Neelesh is training on his own to improve his aerobic endurance.

Give **two** examples of how variation can be applied to reduce boredom in his training. **(2 marks)**

Neelesh could change his training location for one session a week. Instead of running on the road he could run on a treadmill in the gym. He could also try running as part of a group rather than on his own.

Now try this

Give **two** reasons why variation in training is important. **(2 marks)**

Think about how you would feel if yo did the same training all the time.

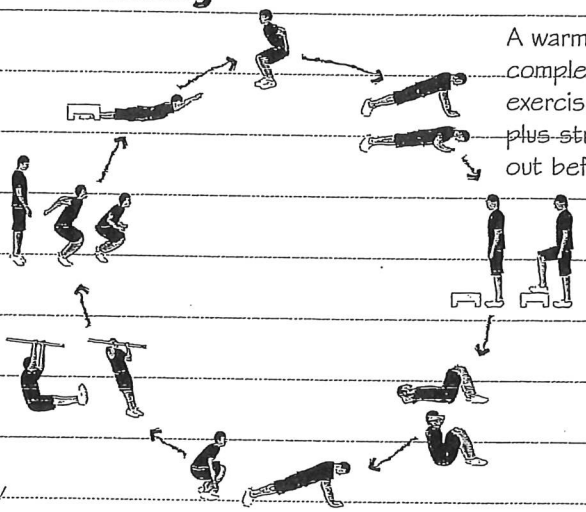
Had a look ☐ Nearly there ☐ Nailed it! ☐

UNIT 1
Learning aim B

Circuit training

A sports performer's training routine can include lots of different training methods. Circuit training involves a series of different activities that can be either sport-specific or tailored to improve certain aspects of fitness. Circuit training can be adapted to suit the fitness needs of the individual. It can also be used to improve general fitness.

Features of circuit training



- Multiple stations
- Can be used to develop all aspects of fitness – depending on the stations chosen
- Can be fitness-based or sport specific
- Can be either aerobic or anaerobic depending on intensity
- A warm-up should always be completed. Some cardiovascular exercises, such as light jogging, plus stretching, should be carried out before circuit training.
- Activities are done for 30–60 seconds
- 30–60 seconds is allowed for moving between stations

Increasing intensity

Intensity can be increased by:

- increasing the time at each station
- increasing the number of circuits completed
- adding extra stations.

Advantage: can be adapted to suit any fitness level or any type of sport.

Disadvantage: often requires lots of space and specialised equipment.

Variation

The exercises at circuit stations should be varied so that muscles have time to recover. To reduce the risk of injury you should never exercise the same body part or muscles consecutively.

Worked example

Ghalib wants to improve his upper-body muscular endurance.

Give **three** examples of stations that would be appropriate for him to include in a circuit. **(3 marks)**

Sit-ups, tricep dips, back raises.

Remember the **principle of specificity** when answering this question. Which stations will help Emma improve her performance at netball?

Now try this

Emma is 15 years old. She has designed a circuit to help improve her performance in netball. The images below show each of the four stations:

Station 1 – running in and out of cones

Station 2 – shots into a netball ring

Station 3 – bowling at a target

Station 4 – chest passes at a wall

Circle the station that isn't appropriate for her circuit. **(1 mark)**

Continuous training

A sports performer's training routine can include lots of different training methods. Continuous training is a steady pace, moderate-intensity training method used for developing aerobic endurance.

Characteristics of continuous training

It involves working at a steady pace for at least 30 minutes with no breaks.

Running at a steady pace for 30 minutes around a running track without stopping is an example of continuous training.

Continuous training must be performed in the correct training zone. This is 60–85 per cent of your maximum heart rate. (Remind yourself how to calculate training zones by looking at page 14.)

Continuous training activities include long distance:

- running
- cycling
- swimming.

This training is great for triathletes.

Applying the FITT principle

- Run more often (frequency)
- Run for longer (time)
- Run at a faster pace (intensity).

Uses of continuous training

Continuous training can be:

- good sport-specific training for marathon runners and long-distance swimmers
- useful for team sport players (e.g. netball/hockey) who might use continuous training as a part of their training routine
- a useful training method for people who have a lower level of fitness
- used to reduce the risk of high blood pressure and coronary heart disease.

Benefits and disadvantages of continuous training

Benefits		Disadvantages	
✓	Easy to organise and do	✗	Training for long distances can be boring
✓	Requires little equipment	✗	Only develops aerobic endurance, not anaerobic
✓	Can be done anywhere	✗	Higher risk of injury if running on a hard surface
✓	Can be made sport-specific	✗	Not ideal for a team sport player (e.g. handball/rugby) as it does not improve speed
✓	Improves aerobic endurance		
✓	Improves muscular endurance		
✓	Good for beginners		

Continuous training can result in overuse injuries, such as shin splints, so it is important to add variation to your training. This variation also helps to reduce boredom.

Worked example

Which of these athletes is most likely to use continuous training as their main training method? **(1 mark)**

A ☐ Dancer B ☑ Long-distance cyclist

C ☐ Gymnast D ☐ Rugby player

Now try this

Colin is 34 years old.

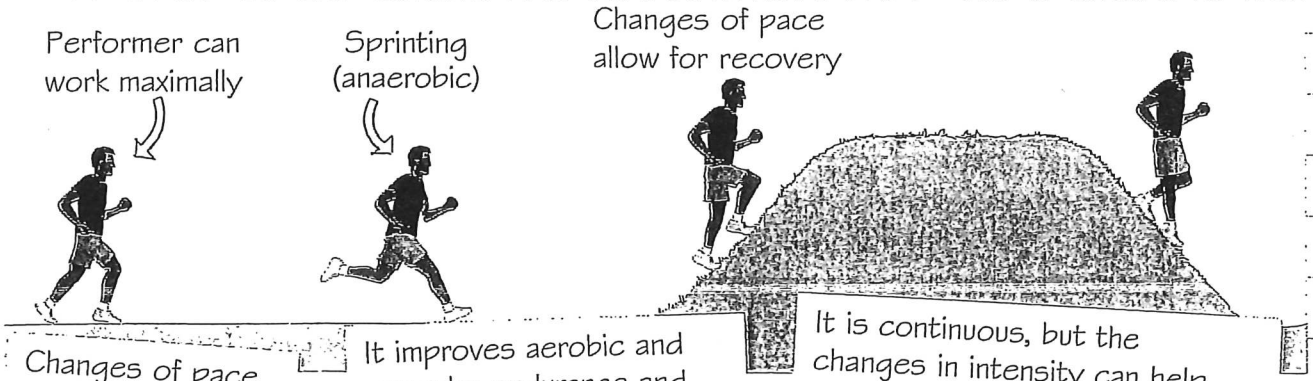
Calculate Colin's target heart rate zone for a continuous training regime. **(4 marks)**

Remind yourself how to calculate target

Fartlek training

A sports performer's training routine can include lots of different training methods. Fartlek training is a form of continuous training where intensity is changed by running at different speeds or over different terrains.

How fartlek training works



Changes of pace allow for recovery.

It improves aerobic and muscular endurance and reduces the chance of coronary heart disease.

It is continuous, but the changes in intensity can help to improve both aerobic and anaerobic performance.

Increasing intensity

There are no rest periods in fartlek training.

You can further increase the intensity of fartlek training by using weighted vests and running harnesses.

Using a running harness increases training intensity.

Adapting fartlek training

Fartlek training can be adapted easily to suit the individual's level of personal fitness and training method. It can be performed on a bike if you are a cyclist or in the pool if you are a swimmer.

It is a good training method for sports team players who need to be able to cope with changes of pace in competition as it helps to improve both aerobic and anaerobic fitness.

Be prepared

- Good running shoes are important if you are running on varied terrains.
- A good warm-up and cool-down are important.

Make sure you think about what can be changed specifically in fartlek training.

Worked example

A cross-country runner decides to include fartlek training in their training programme.

Explain how they might adapt fartlek training to suit their activity. **(2 marks)**

A cross-country runner would focus on changing terrains and inclines to match the conditions they would find in competition.

Now try this

You take part in a team sport (e.g. football).

Explain why you should focus on changing speeds rather than terrains in a fartlek session. **(2 marks)**

Think about what a football pitch looks like. What type of terrain is it?

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Learning aim B

Had a look ☐ Nearly there ☐ Nailed it! ☐

Interval training

A sports performer's training routine can include lots of different training methods. Interval training is where periods of exercising are followed by a rest or recovery period.

Characteristics

Interval training involves periods of high intensity exercise, training for 30 seconds to 5 minutes, followed by periods of rest or lower intensity work. These rest periods allow for recovery and can be complete rest, walking or light jogging.

Interval training is most commonly associated with explosive power activities such as sprinting and weight lifting; however, it can be adapted to develop other aspects of fitness.

Strength could be improved if breaks are programmed into a weight training session, for example:

- 10 reps arms, rest arms
- 10 reps legs, rest legs
- 10 reps arms, rest arms.

Advantages

- ✓ It can be used to develop a number of fitness components, such as aerobic endurance.
- ✓ It requires little equipment.
- ✓ Recovery time gets shorter, which is beneficial to performance.

Disadvantages

- ✗ You need to make sure that you keep working hard when you start to fatigue, which isn't easy.
- ✗ There is also a real risk of overtraining that can cause injuries. Always add variation to this trainin to help avoid this.

Intervals for aerobic endurance

If you want to improve aerobic endurance, make the periods of work longer but perform them at a moderate intensity. Typical work intervals will be around 60% maximumn oxygen uptake (VO_2 max).

To increase intensity you would decrease the number of rest periods but continue to work at an intensity within the aerobic training zone. Remember that this is the intensity part of the FITT principle.

Intervals for speed

If you want to improve your speed or power, use shorter work intervals and perform close to your maximum intensity.

To increase intensity you would reduce the length or number of rest periods and increase the intensity of the work periods.

Worked example

Interval training is a method of training that can be used by a variety of performers.

Which **two** of the following are characteristics of interval training? **(2 marks)**

- A ☑ Periods of work followed by periods of rest
- B ☑ Running at different intensities
- C ☐ Running over different terrains
- D ☐ Working for 30 minutes with no breaks
- E ☐ Accelerating over a 20 minute run

If you want to come back to a question in [illegible] click the 'flag' button.

Sprint drills are a form of interval training.

Now try this

Explain how you could tell by looking at a performer's interval training session plan if they were an endurance or power athlete. **(2 marks)**

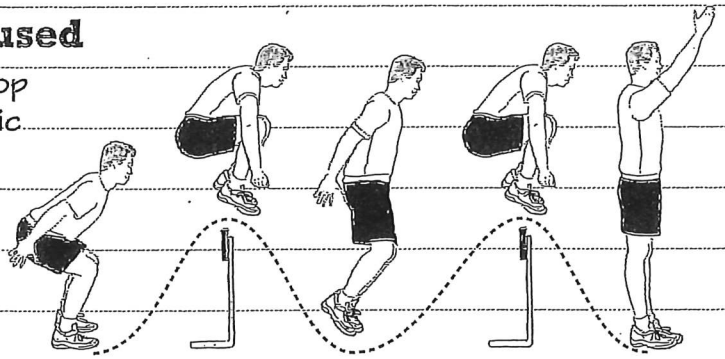
Plyometric training

A sports performer's training routine can include lots of different training methods. Plyometric training develops sport-specific explosive power and strength.

How plyometric training is used

Plyometric training can be used to develop power and speed as well as sport-specific skills. It involves lots of explosive movements and works by making muscles exert their maximal force in a short time period.

Plyometric training involves exercises that make the muscles contract and relax rapidly.



Hurdling is a type of plyometric exercise.

Types of plyometric exercises

There are a number of exercises you can do as part of your training: bounding, lunges, inclined press-ups, hurdle jumping, press-ups with claps.

An intense warm-up is vital to prevent injury and to warm muscles up thoroughly.

Intensity can be increased by increasing the number of repetitions of an exercise, this should be done carefully as this training is intense and so can result in injury.

Sports performers that benefit from plyometric training are:

- sprinters – they need explosive power at take-off when they hear the starting gun
- hurdlers – they need to jump over hurdles while maintaining speed
- volleyball players – they need to jump high and contest the ball.

Plyometric training is useful for basketball players.

How it works

It is important to learn and practise the techniques for plyometric training as it can be physically stressful and cause muscle soreness. Exercises need to be performed on a suitable surface that will absorb some of the force being produced. Plyometric exercises need maximal force as the muscle lengthens (eccentric action) before an immediate maximal force as the muscle shortens (concentric action).

Advantage: can be adapted to suit a variety of sports.
Disadvantages: not suitable for young athletes and need to be careful with techniques to avoid injury.

Worked example

State **one** way plyometric training could be incorporated into the training routine of a rugby player? **(1 mark)**

Plyometric training can be organised as part of a circuit training session with stations such as box jumps and inclined press-ups.

Now try this

Explain how plyometric training helps to prepare an athlete for a sport-specific performance of your choice. **(2 marks)**

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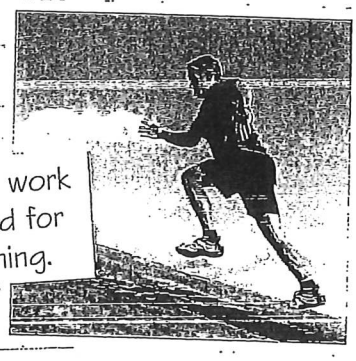
Learning aim B

Had a look ☐ Nearly there ☐ Nailed it! ☐

Speed training methods

A sports performer's training routine can include lots of different training methods. Speed training takes different forms and can be made sport-specific.

The type of speed training an athlete chooses will depend on their sport and their fitness goals. For example, if a long jumper wanted to improve their speed on their run-up they would choose acceleration sprint training.



Resistance work can be used for speed training.

1 Acceleration sprints

- Pace is increased gradually from standing or rolling to jogging, then striding, and then to a maximum sprint.
- Different drills, such as resistance work and hill runs, can be used.
- Rest intervals of jogging or walking are used between each repetition.
- They are a good form of anaerobic training.

2 Hollow sprints

- A series of sprints is followed by 'hollow' periods of jogging or walking.
- They are useful for football players who need constant changes of speed during a game.

3 Interval training

- A work period is followed by a rest or recovery period.
- To develop speed, work intervals will be short and performed at a high intensity.
- Speed is developed by increasing work intensity and the number of rest periods.
- Intervals vary depending on the individual athlete's goals. For example:
  - 100 m sprinter: 10 x 30 m @ race pace
  - 800 m runner: 5 x 200 m @ goal race pace

Applying the FITT principle

Overload can be achieved by reducing the length of the rest period and increasing the length or intensity of the work periods. Intensity can be increased by running up hills or along more challenging terrain.

Advantages: need little specialist equipment and can be adapted to suit an individual's training needs.

Disadvantages: it can become tedious and so should be used with other training methods.

Worked example

Which type of speed training method would be most appropriate for a hockey player? **(1 mark)**

A ☐ Interval training
B ☐ Resistance training
C ☑ Hollow sprints
D ☐ Acceleration sprints

Think about a car accelerating away from stationary – can you use this action to help you answer the question?

Now try this

Outline **one** difference between acceleration sprints and hollow sprints. **(1 mark)**

Flexibility training

Flexibility is important for all sports performers. The principle of specifity should be applied to flexibility training – you should stretch the muscle groups that will be used in your sport. There are three types of flexibility training methods.

1 Static stretching

STATIC STRETCHING helps you to reduce the risk of muscle soreness and injury. There are two types of static flexibility training; active and passive:

1 ACTIVE STRETCHING is performed independently and uses internal force to stretch and lengthen the muscle.

Active stretching.

Passive stretching.

2 PASSIVE STRETCHING requires the help of another person or object to provide external force, causing the muscle to stretch.

2 Ballistic stretching

BALLISTIC STRETCHING uses the force of limb movement to stretch muscles beyond their normal range of movement.

The movements are fast and jerky and usually involve bouncing through the full range of movement. These types of bouncing movements mean that there is the potential for injury.

Ballistic stretching can incorporate sport-specific movements and can form a useful part of a warm-up.

3 Proprioceptive neuromuscular facilitation (PNF)

- PNF is an advanced form of passive stretching, using a partner or object to provide resistance.
- PNF is used to develop flexibility, mobility and strength.
- It is often used in rehabilitation programmes when recovering from injury.
- The stretch is held at its upper limit for 6–10 seconds.
- The stretch is enhanced by ISOMETRICALLY contracting the muscle you are stretching. In the stretch shown in the image above, this would involve pushing the left leg against the object.
- After 10 seconds the muscle is relaxed from the isometric contraction and stretched further with the help of a partner or object.
- The process is then repeated.

Warm-up

All sports performers should conduct some form of flexibility training as part of their WARM-UP to reduce the risk of injury.

Performers such as gymnasts and hurdlers use flexibility training as part of their warm-up in order to improve performance.

Worked example

Outline **one** difference between passive stretching and PNF. **(1 mark)**

Passive stretching is normally used as part of a warm-up, whereas PNF is most often used in sports rehabilitation.

Now try this

What type of flexibility training is this athlete performing? **(1 mark)**

A ☐ PNF
B ☐ Ballistic stretching
C ☐ Active stretching
D ☐ Passive stretching

Weight training

Weight training is a form of interval training. It involves using reps (the number of times the weight is lifted) and sets of reps (for example, 3 sets of 12 reps).

Purpose of weight training

- To develop STRENGTH – low reps but high load.
- To develop ENDURANCE – high reps but low load.

1 rep max (1RM)

1RM refers to the maximum amount of weight a person can lift in a single repetition of a given exercise.

Intensity can be set using a percentage of this figure.

A typical programme

1. Focus on core exercises (working muscles that help to stabilise the spine and pelvis)
2. Assistance exercises (working specific muscles for a performer's sport or training programme)
3. Alternate between upper and lower body exercises and alternate between push and pull exercises.

Maintaining safety

You should always follow the correct guidelines when using weights. Using the correct weight and technique will help reduce the risk of injury.

Applying the FITT principle

- Increase the resistance.
- Increase the number of reps.
- Increase the number of sets.

The use of dumb-bells and barbells allow people to perform different dynamic exercises.

Training for	Percentage of 1RM and number of reps	Used for
Strength endurance	50–60% of 1RM and 20 reps	Repetitive movements of a muscle, e.g. cycling
Elastic strength	75% of 1RM and 12 reps	Producing movements in quick succession, e.g. gymnastics
Maximum strength	90% of 1RM and 6 reps	Single movements against a load, e.g. shot put

Example: Shot-putter

A shot-putter would want to develop their maximum strength as this is crucial to their event. To achieve this they would train using heavy weights for a low number of reps.

Allow time for recovery to reduce risk of injury and allow adaptations to occur. The intensity of training and weight lifted will depend on individual goals.

Advantages: can be adapted to different performers.

Disadvantges: requires specialised equipment. If used incorrectly can cause injury.

Worked example

Emil wants to develop his elastic strength.
His 1RM is 135 kg.

What would be an approximate weight for him to lift to improve his elastic strength?
(2 marks)

75% of 135 = 12 reps of 101.25 kg

Now try this

Give **two** reasons why it is important to have a recovery period after weight training.
(2 marks)

Fitness testing: importance to sports performers and coaches

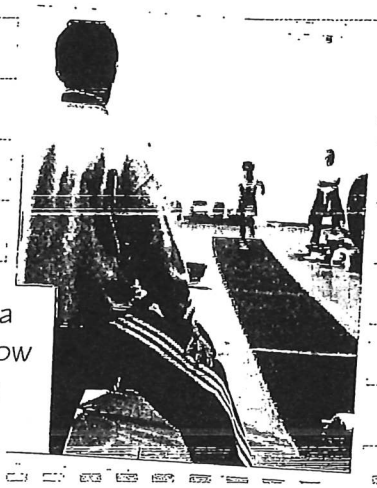
When thinking about why we test fitness, don't forget to think about before, during and after the training programme – you need to be able to monitor whether the training is working.

Baseline data

Fitness testing provides BASELINE data from which we can monitor and improve performance.

Baseline data are the scores recorded at the start of any training programme.

For example, a gymnast's coach might record baseline data for flexibility, strength and speed. Over time these tests can be repeated, helping to show improvements and areas for further attention.



Baseline data for a gymnast might show flexibility, strength and speed.

Training programmes

Coaches can use baseline data to design training programmes based on a performer's strengths and weaknesses.

If a sprinter has good speed but their reaction time is below average, it gives the coach and athlete an area of training to focus on.

Fitness testing also allows you to see if training programmes are working. By repeating the same tests before and after a training block you can see if programmes have been effective.

FITT principle

After test results, coaches will use the FITT principle to plan training programmes.

See page 15 to remind yourself of the FITT principle.

Goal setting

Fitness testing results can provide performers with something to aim for and allow them to set themselves goals. This can be motivating and will encourage them to work hard in training.

For example, a netball wing attack may set themselves a target of improving their Illinois agility run test scores by 3 seconds over a 6-week training period (see page 39). By testing at regular intervals they will be able to see their progress towards this goal.

Learn these!

The following pages of this revision guide cover various fitness tests. Make sure you are able to describe how each test is carried out, what it measures and who might use it.

Worked example

State **one** reason why it is important to record baseline fitness scores. **(1 mark)**

Baseline scores are important because they provide you with something to compare further test scores against.

Now try this

What might a coach do if an athlete's post-training programme test results showed no improvement? **(1 mark)**

A ☐ Consider changing the frequency, intensity, time or type of training as it currently might not be appropriate

B ☐ Repeat the same training programme but make the performer take longer rest breaks

C ☐ Repeat the same training programme but make the performer train for longer

D ☐ Consider changing the equipment that the performer has been using