Principles and variables

**Unit:** Principles of exercise, fitness and health
Learning outcomes & assessment criteria

Learning outcome: The learner will:

LO3: Understand how to apply the principles and variables of fitness to an exercise programme

Assessment criteria: The learner can:

3.1. Describe the physiological implications of specificity, progressive overload, reversibility, adaptability, individuality and recovery
3.2. Explain the principles of FITT
3.3. Explain the principles of a progressive training programme in developing components of fitness
3.4. Explain how to recognise when and how to regress a training programme
3.5. Explain the principles of adaptation, modification and progression for each component of FITT
3.6. Describe the effect of speed on posture, alignment and intensity
3.7. Describe the effect of levers, gravity and resistance on exercise
3.8. Describe the differences between programming exercise for physical fitness and for health benefits
**Principles and variables**

**TASK**

Use the manual to describe the terms listed.

Discuss the physiological implications of these principles

- Specificity
- Progressive overload
- Reversibility
- Adaptability
- Individuality
- Recovery
- Frequency
- Intensity
- Time
- Type
Training principles

**Specificity** - adaptations to the body’s muscles, organs and systems will be specific to the type of training undertaken
Specificity

If fitness goals are very specific, it will be important to consider:

- The predominant energy system and muscle fibre type used for the sport.
- The main prime movers recruited and joint actions required.
- The joint angle and range of movement used.
- The type of muscle contraction (concentric/eccentric) and speed of movement.
Training principles

**Progressive overload** - to evoke an adaptation response the stimulus must be large enough to challenge the individual, without overtraining.
Training principles

**Reversibility** - cessation of the stimulus which caused the adaptation to occur will result in a gradual decline

Use it, or lose it!
Training principles

**Adaptability** - the body will respond to the type of overload it is subjected to making it more efficient
Training principles

Recovery – the rest periods between exercise sessions is a vital part of any plan as this is when improvements occur.

Physiological adaptations occur in the time following the activity rather than during it.
Training principles

**Individuality** – each client must have a specific exercise plan that takes into account their individual abilities and needs, e.g. age, gender, fitness and skill level etc.

**Individual differences**
- Age.
- Gender.
- Body type.
- Heredity.
- Muscle fibre type.
- Range of motion (ROM).
- Strength.
- Cardiovascular fitness.
FITT principle

**Frequency** – how often?

- e.g. the number of exercise sessions in a given period

**Intensity** – how hard?

- e.g. the level of exercise difficulty and effort required

**Time** – how long?

- e.g. the length of time devoted to each exercise session

**Type** – what activity or component of fitness?

- e.g. the mode and method of exercise selected (specificity)
Principles and variables

TASK

What are the recommended training guidelines (application of FITT) for:

- Physical fitness
  - Cardiovascular
  - Muscular
  - Flexibility
- Physical activity for health
Physical activity recommendations for health

- 150 minutes of moderate-intensity aerobic activity every week
  Or
- 75 minutes of vigorous-intensity activities
  Or
- An equivalent combination of both
  Plus
- At least two days a week of muscular strength and endurance training

*Move more often, sit down less*
# Cardiovascular fitness guidelines

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Three to five days a week.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Intensity</strong></td>
<td>Moderate to vigorous intensity.</td>
</tr>
<tr>
<td></td>
<td>- Moderate: 50-65% of MHR or 12-14 RPE.</td>
</tr>
<tr>
<td></td>
<td>- Vigorous: 65-90% of MHR or 15-18 RPE.</td>
</tr>
<tr>
<td><strong>Time</strong></td>
<td>20-30 minutes or up 60 minutes of continuous or intermittent activity.</td>
</tr>
<tr>
<td></td>
<td>- Moderate intensity: 30 minutes, which can be accumulated</td>
</tr>
<tr>
<td></td>
<td>- Vigorous intensity: 20 minutes sustained.</td>
</tr>
<tr>
<td><strong>Considerations</strong></td>
<td>Untrained or deconditioned individuals will need to work towards these recommendations</td>
</tr>
</tbody>
</table>
# Muscular fitness guidelines

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Two-three days a week for each major muscle group on non-consecutive days. 48 hours rest between training sessions for specific muscle groups.</th>
</tr>
</thead>
</table>
| Intensity       | Percentage of one repetition maximum (1RM):  
• 40-50% of 1RM for older adults or sedentary adults.  
• 60-70% of 1RM for beginners.  
• > 80% of 1RM for experienced. |
| Time            | Repetitions  
• 8-12 repetitions.  
• 10-15 repetitions for beginners.  
• 15-20 repetitions for endurance.  
Sets  
• Single sets effective for beginners or older adults.  
• 2-4 sets for adults.  
• < 2 sets is effective for endurance.  
Rest  
• Intervals or 2-3 minutes between sets. |
## Flexibility guidelines

<table>
<thead>
<tr>
<th><strong>Frequency</strong></th>
<th>&gt; 2-3 days a week. Ideally every day</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Intensity</strong></td>
<td>To the point of mild tension and mild discomfort</td>
</tr>
</tbody>
</table>
| **Time**        | Static stretches 10—30 seconds  
2-4 repetitions of specific muscle stretches  
PNF – static contraction for 3-6 seconds followed by 10-30 second static stretch  
NB: A total of 60 seconds per muscle group is recommended. Stretches can be repeated 2-4 times to achieve this total |
| **Considerations** | Ensure the body is warm before stretching  
Lengthen all muscles before exercise (dynamic or static)  
Stretch all major muscle groups after work (static stretching – developmental or maintenance) |
Principles and variables

TASK

Select FOUR exercises from your chosen exercise discipline.

Show an example of how you could alter the following

– Lever length
– Gravity
– Resistance

Describe the effect of levers, gravity and resistance on exercise (progression or regression)
Intensity factors

To increase exercise intensity (resistance):

• Lever length – increasing lever length
• Gravity – work against gravity
• Resistance – add weight
• ROM – moving through a fuller range of movement
Principles and variables

TASK

Choose six different exercises.

Perform each exercise at different speeds.

Describe the effect of speed on:

• Posture
• Alignment
• Intensity
Speed

- Slow - muscle contracting for longer
- Fast – can exceed range of motion (ballistic)
- Posture and alignment – harder to maintain when moving quickly
Principles and variables

**TASK**

When would you need to:

- Regress a training programme?
- Progress a training programme?

Consider:
- How would you recognise when to regress or progress?
Principles of progression

To avoid a slowing or decrease in performance, known as a plateau, the principles of progression should be applied.
Progression

Overload should be gradual and not excessive.

Excessive overload will be counterproductive and slow down or reverse exercise-related gains.

Progression variables:

• Resistance, leverage, gravity
• Repetitions
• Range of motion
• Rest
• Rate/speed
• Type
When to regress a programme

Reasons for regression may include:

• A holiday, vacation or a break from training.
• A period of illness.
• Progression or worsening of a chronic health condition.
• The individual is unable to cope.
Overtraining

Should the overload stimulus exceed the body’s ability to adapt either injury or overtraining may result.

Be alert to the signs and symptoms of overtraining which include:

- Sudden poor co-ordination
- Lack of ability to concentrate
- Reduction in performance
- Irritability, over sensitivity to criticism
- Reported disrupted sleep patterns
- General lethargy
- Susceptibility to colds, illness
Overtraining

It is not necessary to regress every aspect of a training programme if overtraining is suspected.

It may be sufficient to reduce just a few of the variables such as selecting one or two of the following:

- Increasing the rest time between sets
- Reducing the frequency from 4 exercise sessions per week to 3
- Reducing the weight or resistance on certain exercises
- Reducing the length or time of the total session
- Changing from high impact to low impact activities
- Changing exercise complexity by choosing simpler exercises
Learning review

**Assessment criteria:** Can you now:

- Describe the physiological implications of specificity, progressive overload, reversibility, adaptability, individuality and recovery
- Explain the principles of FITT
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