PEARSON BTEC TECH AWARD LEVEL 1/2 IN SPORT

Component 3A: Explore the importance of fitness for sports performance

Teacher Answer Booklet



A1: The importance of fitness for successful participation in sport
A2: Fitness training principles
A3: Exercise intensity and how it can be determined

A1: The importance of fitness for successful participation in sport

Many types of sports require specific components of fitness.

Please match the examples of sports with the components of fitness that are required for the sport. The first component has been completed as an example.

Sports Examples: sprinting, discus throwing, gymnastics, martial arts, basketball, tennis, marathons, cycling, football (goalkeeping), skiing, ice skating

Components of fitness	**Used for**	**Sports requiring the component**
Aerobic Endurance	Events/sports lasting more than 30 minutes	Marathons
Muscular Endurance	Events/sports lasting more than 30 minutes	Cycling
Muscular Strength	Activities requiring force	Discuss Throwing
Speed	Activities requiring fast movement	Sprinting
Flexibility	Activities requiring a wide range of movement around a joint	Martial Arts
Body Composition	Low body fat	Gymnastics
Power	Activities requiring explosive movement	Basketball
Agility	Activities requiring quick changes of direction	Skiing
Reaction Time	Any activity where a quick decision or response to a stimulus is needed	Football (goalkeeping)
Balance	An activity requiring control of the distribution of weight or to remain upright and steady	Ice skating
Coordination	Any activity requiring movement of two or more body parts	Tennis

Name 3 components of fitness required for the following sports:

Hockey:

1. Agility
2. Coordination
3. Aerobic Endurance

Swimming:

1. Muscular Endurance
2. Speed
3. Reaction Time

A2: Fitness training principles

You need to be able to understand the principles of training and how they can be applied to training programmes.

There are 4 basic principles of training:

1. **Frequency**
2. **Intensity**
3. **Time**
4. **Type (FITT)**

Match the basic principles of training with their descriptions and then how a weightlifter would incorporate them in their training.

Principle of Training	Description
Frequency	The number of training sessions completed over a period of time, usually per week
Type (FITT)	How an individual will train by selecting a training method to improve a specific component of fitness.
Intensity	How hard an individual will train.
Time	How long an individual will train.

How would a weightlifter incorporate these basic principles in their training?

Frequency:

Increase the amount of sessions that they are taking part in per week.

Intensity:

Increase the weight that they are lifting (muscular strength) or the number of reps that they are performing (muscular strength)

Time:

Increase the total time spent during sessions, for example increasing the time spent on each activity in the gym

Type:

It would be most appropriate for a weightlifter to use weight training in the gym

Additional Principles of Training:

Progressive Overload:

This means gradually increasing the amount of overload during training in order to improve fitness but without injury. In other words, if you increase the intensity of your workouts gradually you will make steady improvements.

Explain how an athlete could use progressive overload to increase their muscular endurance whilst using a bench press. Give an example in your answer.

In order to improve muscular endurance steadily the performer should use a relatively light weight such as 30kg. In their first session they might complete 20 reps but every session thereafter increase the amount of reps by 5. This will result in a gradual improvement.

Explain how an athlete could use progressive overload to increase their muscular strength whilst using a bench press. Give an example in your answer.

In order to improve muscular strength steadily the performer could start with a relatively heavy weight such as 70kg and perform 4-6 reps. They could then increase the weight by 2.5kg every session whilst always maintaining the 4-6 reps. This will result in a gradual improvement.



Specificity:

This means matching training to the requirements of an activity. Different sports (and different positions within sport) require athletes to excel in different components of fitness.

How would the training programme of a marathon runner and a weightlifter differ?

A marathon runner would be looking to do hours of running in order to build their muscular endurance and cardiovascular fitness. A weightlifter would be hoping for muscular hypertrophy and focusing on lifting heavy weights in order to improve muscular strength and power.

How would the training programme in football differ for a goalkeeper and a striker?

A goalkeeper in football requires agility, balance and good hand-eye coordination, so they must use drills and practices to improve these skills. A striker requires speed to beat a defender and muscular strength in the quadriceps to enforce a powerful shot. Therefore, they must focus on these components in their training.

Individual Differences:

The first thing an athlete must consider when creating an exercise programme is their own individual needs. The needs of an individual could alter due to their fitness level, weight, gender or previous injuries.

Why would it not be a good idea for a first-time marathon runner to follow the training programme of an elite athlete?

A first-time runner would not cope with the intensity of a programme for an elite athlete, which would likely result in an injury occurring or the runner becoming fatigued and demotivated.

Adaptation:

This is about how your body changes due to increased training loads.

Using weightlifting as an example again, describe how a beginner would adapt their training over 2 weeks.

A beginning weightlifter performs squats with 10 repetitions at 150 pounds. After 2 weeks of lifting this weight, the lifter notices the 150 pounds feels easier during the lift and afterwards causes less fatigue.

Reversibility:

This means gradually losing fitness and occurs to anybody who stops training.

Give 3 reasons why reversibility might occur to an individual.

1. **Overtraining**
2. **Injury**
3. **Loss of Motivation**



Variation:

You can avoid boredom and maintain motivation to train by altering the types of training.

How could a basketball player make their dribbling drill more interesting?

Play music
Do different dribbles (include skills)
Progress drill (add shooting at the end or a defender)

Rest & Recovery:

This is very important during an exercise programme and without rest, progressive overload is unlikely to occur.

Why is it important for a marathon runner to rest following a heavy training session?

A heavy training session will result in a runner performing close to their 'lactate threshold'. This means that even though the respiration has been aerobic, there will be some lactic acid build up and muscle aches. It is not a good idea to train until this aching has stopped.
The leg muscles will also have been damaged slightly during a session and rest will be required for repair and recovery.

A3: Exercise intensity and how it can be determined

Sports performers need to understand exercise intensity and how it can be measured or worked out. They will also understand the target zones and the related technical vocabulary.

Intensity:

You can measure exercise intensity by measuring heart rate (HR). You can do this by feeling your **Pulse** (either at your carotid/wrist) for 30 seconds and multiply it by **2**.

Target Zones & Training Thresholds:

Training thresholds are set to make sure that people train at an effective but safe level.

The calculation of your target zones is known as **The Karvonen Formula.**

The Karvonen Formula (simplified):

Firstly work out your maximum heart rate with the formula: **220 – age (in years)**

What is the maximum heart rate for a 15 year old? **220 – 15 = 205bpm**

Your aerobic zone is what percentage of your maximum HR? **60-80%**

Therefore what is your aerobic target zone? **123 – 164bpm**
Your anaerobic zone is what percentage of your maximum HR? **80-90%**

Therefore what is your anaerobic target zone? **164-184.5bpm**

Example 1: Emma is 20 and is training for a marathon. Using the karvonen formula (simplified), how would you work out Emma's aerobic training zone? (3 marks)

Mark One – Emma would take 60/70/80% of his maximum heart rate (you can use any % between 60-80%)
Mark Two – Maximum heart rate = 220-Age, so Emma's heart rate is 220-20 = 200BPM
Mark Three – 70% of MHR = 140 / 80% of MHR = 160 (etc.)



Example 2: Tom is 16, has a resting heart rate of 64 bpm and has just completed a six-week personal exercise programme (PEP):

Week 1 – 180

Week 2 – 172

Week 3 – 160

Week 4 – 175

Week 5 – 145

Week 6 - 150

State the total number of weeks Tom's heart rate was within his aerobic target zone.

(1 mark)

A One

B Two

C Three

D Four

Answer: C - Three

State the total number of weeks Tom's heart rate was within his anaerobic target zone.

(1)

A One

B Two

C Three

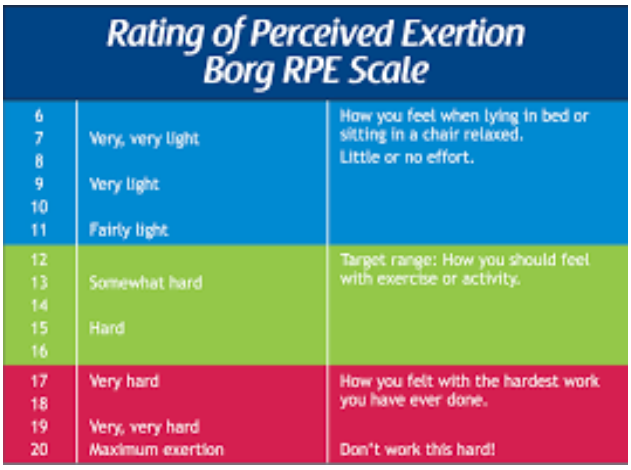
D Four

Answer: C – Three

The Borg Rating of Perceived Exertion Scale:

This rating is a way of measuring physical activity intensity level.

Perceived exertion is how hard you feel like your body is working. It is based on the physical sensations a person experiences during physical activity, including increased heart rate, increased respiration or breathing rate, increased sweating, and muscle fatigue.



RPE can be used to estimate heart rate (HR), using the equation:

RPE x 10 = HR

Example 1: Lucy has completed ballet for 30 minutes and her RPE is 14. Estimate her heart rate.

RPE x 10 = HR
14 x 10 = 140 bpm

Example 2: Aidan has a heart rate of 160bpm after completing 2 hours of tennis. What is his RPE?

HR = 10 x RPE
RPE = HR/10
RPE = 160/10 = 16

Repetition Maximums:

1 Rep Max. (RM) = the heaviest amount you can lift in one repetition.

15 Rep Max. (RM) = the heaviest amount you can lift and repeat 15 times.

Match the types of RMs with their relevant component of fitness.

Strength	**Muscular Endurance**

1 RM is for **strength**.

15 RM is for **muscular endurance**.

Technology to Measure Exercise Intensity:

To measure exercise intensity, you can use:

1. Heart Rate Monitors
2. Smart Watches
3. Apps

Describe how a runner could use the above technologies to measure the intensity of their running.

- **Can use heart rate monitors to monitor HR and calculate training thresholds.**
- **Can use smart watches to monitor heart rate again and timing/speed.**
- **Can use running apps to measure distance and track progress.**

Key Terms

Individual Differences – The needs of an individual could alter due to their fitness level, weight, gender or previous injuries.

Specificity – The particular requirements of an activity

Progressive Overload – Gradually increasing the amount of overload to improve fitness but without injury

FITT Principle – Training principle linked to progressive overload, based on frequency, intensity, time and type

Reversibility – Gradually losing fitness instead of progressing

Target Zone – The range within which an individual needs to work

Training Threshold – A safe and effective level to train at

Karvonen Formula – A test to find out an individual's optimum heart rate

Resting Heart Rate – The amount of times your heart beats per minute at rest (normal RHR is 60-80 BPM)

Maximum Heart Rate – Your highest possible heart rate. 220 – Age