**NCFE Level 1 / 2 Technical Award in Health and Fitness**

**Unit 1**

Introduction to body systems and principles of training in health and fitness

**Workbook**

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**Using this Workbook**

This workbook is intended to be used as a revision tool, supplementary to any activities and worksheets that form part of the main lessons. Your teacher will guide you about how and when you need to complete any parts of this workbook.

# The skeletal system

### Functions of the skeleton

The skeleton has many functions, in the box below identify these functions and explain them.

Can you make a mnemonic to help you remember these? List this in the box also.

### Structure of the skeletal system

The human skeleton is made up of the axial and appendicular skeleton.

In the box below write down what you understand by these terms.

Can you draw a picture of a human skeleton and shade in the bones that form the axial skeleton in one colour and the parts that make the appendicular in another?

### Types of bone:

There are 5 types of bone found in the human body. Can you name these in the table below, providing a short description and an example?

|  |  |  |
| --- | --- | --- |
| Type | Description | Example |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

### The location of the major bones

Draw a skeleton and label the major bones.

As an extension task, colour in the bones to represent a type of bone. For example, long bones in red.

### The types of joint

What is a joint? Write your answer in the box below:

What are the **3 types** of joint? Write your answer in the box below giving an example for each:

Draw a knee joint and label the structures:

Describe the structure of the knee joint in the box below noting the type of joint, the movements permitted, the articulating bones, the muscles involved in its movement and any connective tissue:

### Vertebral column

Define the term ‘posture’.

The vertebral column is made up of 33 vertebrae, a healthy spine has curves to it that help absorb stress from body movement and gravity.

Draw a vertebral column shading in each of the sections in a different colour.

There are 3 main types of spine curvature disorder.

Describe the conditions lordosis, kyphosis and scoliosis using the table below:

|  |  |
| --- | --- |
| Spine curvature | Description |
| Lordosis |  |
| Kyphosis |  |
| Scoliosis |  |

Now, try to draw the conditions lordosis, kyphosis and scoliosis.

# The muscular system

### List the functions of the muscular system

There are over 600 muscles in the human body, the muscular system has many functions. Identify and describe the main functions of the muscular system in the box below:

### Types of muscle

There are 3 main types of muscle found in the body. Can you name the 3 types and include a description and an example of each?

|  |  |  |
| --- | --- | --- |
| Type of muscle | Description | Example |
|  |  |  |
|  |  |  |
|  |  |  |

### The location of the major muscles

Draw a human labelling the location of the major muscles.

As an extension task you could note each muscles primary function.

### Movement terminology

Specific terminology is used when describing movement.

Explain the terms flexion, extension, abduction, adduction and rotation.

Can you give some specific examples of joints where that movement is permitted?

|  |  |  |
| --- | --- | --- |
| Movement | Explanation | Joint examples |
| Flexion |  |  |
| Extension |  |  |
| Abduction |  |  |
| Adduction |  |  |
| Rotation |  |  |

### Muscle contraction

Describe, using an example, antagonistic muscle action. Note the 2 types of contraction in the box below.

### Muscle fibre types

There are 2 types of muscle fibre found in human muscles – **slow twitch** and **fast twitch**. The percentage of each that individuals have is genetically determined.

List the characteristics of each fibre type in the box below:

|  |  |
| --- | --- |
| SLOW TWITCH FIBRES | FAST TWITCH FIBRES |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

# The respiratory system

### The functions of the respiratory system

The respiratory system is responsible primarily for the uptake of one gas and the removal of another.

Can you describe these 2 functions in more detail?

### The structure of the respiratory system and the passage of air

The respiratory system has many components. Can you describe the passage that air takes as it is inhaled from atmospheric air, through its delivery into the blood? Make a note of the specific respiratory structures throughout your explanation in the box below.

### Mechanics of breathing

Breathing involves inhalation and exhalation. Using your knowledge of muscles, pressure and volume, describe the mechanics of breathing both at rest and during exercise.

|  |  |
| --- | --- |
|  | Mechanics |
| **Inhalation at rest** |  |
| **Exhalation at rest** |  |
| **Inhalation during exercise** |  |
| **Exhalation during exercise** |  |

### Lung volumes

Certain lung volumes can be measured using a spirometer. Can you describe tidal volume, inspiratory reserve volume, expiratory reserve volume and vital capacity?

|  |  |
| --- | --- |
| Lung volume | Description |
| **Tidal Volume** |  |
| **Inspiratory reserve Volume** |  |
| **Expiratory reserve Volume** |  |
| **Vital Capacity** |  |

# The cardiovascular system

### The functions of the cardiovascular system

The Cardiovascular system has several functions. Can you describe them in the box below?

### The components of the cardiovascular system

There are 3 components to the CV System. Can you list them in the box below?

### The structure of the heart

Using your knowledge of the structural parts of the heart, can you describe its location, the chambers, the arteries and veins, the septum and the valves?

As an extension task you could draw a diagram, labelling the key sections.

Can you shade the deoxygenated sections in blue and the oxygenated sections in red?

### The structure and function of the blood vessels

There are 3 main types of blood vessel. Can you identify each type describing its structure and function?

|  |  |  |
| --- | --- | --- |
| Vessel | Function | Structure |
| **Arteries** |  |  |
| **Veins** |  |  |
| **Capillaries** |  |  |

### The structure and function of the blood

The blood is our transport medium around the body, it delivers nutrients, hormones and gases to where they are required and removes waste. Can you list the 4 main components of blood and describe their function?

|  |  |
| --- | --- |
| Component | Function |
| **Red Blood Cells** |  |
| **White Blood Cells** |  |
| **Platelets** |  |
| **Plasma** |  |

### Cardiac measurements

There are several cardiac dynamics that can be measured. Can you define the terms heart rate, stroke volume, cardiac output and blood pressure?

|  |  |
| --- | --- |
| Measurement | Description |
| **Heart Rate** |  |
| **Stroke Volume** |  |
| **Cardiac Output** |  |
| **Blood Pressure** |  |

### Cardiac cycle

The cardiac cycle describes the process of blood entering and exiting the heart. Can you describe the cardiac cycle in the box below showing your knowledge of valves, blood vessels and blood pressure?

# The energy systems

Energy can be provided by the body through two systems. Describe the 2 systems giving an example of when each system would be the predominant system.

|  |  |  |
| --- | --- | --- |
| System | Description | When used |
| **Aerobic** |  |  |
| **Anaerobic** |  |  |

### Short term responses of exercise to the body systems

As an immediate effect of exercise, the body changes to meet the demands of the activity. These are short term responses that reverse when the body stops exercising.

Can you list as many short term responses as you can in the box below?

### Long term adaptations of exercise to the body systems

Following prolonged training (months and years), the body adapts and becomes more efficient. These are long term are not quickly reversed.

Can you list as many long term responses as you can in the box below?

# Health and fitness and the principles of training

Define the term ‘health’:

Define the term ‘fitness’:

### Components of Skill Related Fitness (SRF)

Skill related fitness are sport specific components that are needed by specific athletes to a greater or lesser extent. List the 6 SRF components in the table below and describe each.

|  |  |
| --- | --- |
| Component | Description |
| **Component** |  |
| **Agility** |  |
| **Balance** |  |
| **Co-ordination** |  |
| **Speed** |  |
| **Power** |  |

### Components of Health Related Fitness (HRF)

Health related fitness are for general fitness and we would all benefit from improving them. List the 5 HRF components in the table below and describe each.

|  |  |
| --- | --- |
| Component | Description |
| **Cardiovascular endurance** |  |
| **Muscular endurance** |  |
| **Muscular strength** |  |
| **Flexibility** |  |
| **Body composition** |  |

### Testing fitness

Can you provide a description of each test listed in the table below?

|  |  |  |
| --- | --- | --- |
| Component | Name of test | Description of test |
| **Cardiovascular endurance** | **Coopers 12-minute Run** |  |
| **Muscular endurance** | **Sit up test** |  |
| **Muscular strength** | **Grip Dynamometer Test** |  |
| **Flexibility** | **Sit and reach test** |  |
| **Body composition** | **BMI** |  |
| **Agility** | **Illinios Agility Test** |  |
| **Balance** | **Standing Stork test** |  |
| **Co-ordination** | **Hand – eye coordination test** |  |
| **Speed** | **35m sprint** |  |
| **Power** | **Standing Broad Jump** |  |
| **Reaction time** | **Ruler Drop test** |  |

### Principles of training

There are several principles that must be applied to all training programmes if they are to be safe and effective. The acronyms SPORT and FITT are a useful tool to remember them. List the principles in the table below providing a description for each.

|  |  |
| --- | --- |
| Principle | Description |
| **Specificity** |  |
| **Progressive Overload** |  |
| **Reversibility** |  |
| **Tedium Avoidance** |  |
| **Frequency** |  |
| **Intensity** |  |
| **Time** |  |
| **Type** |  |

### Methods of training

There are many methods of training that can be designed to improve specific fitness aims. Describe the methods listed in the table below. If you get a chance, try and take part in at least one of the types listed.

|  |  |
| --- | --- |
| Method | Description |
| **Circuit** |  |
| **Continuous** |  |
| **Fartlek** |  |
| **Interval** |  |
| **Resistance** |  |

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