

**mulberry**  
Academy Shoreditch



**BTEC**

**PE**

# **BTEC PE Transition Booklet Skeletal System**



<b>A1 - Structure of skeletal system</b>	<b>Pre Revision</b>	<b>Post Revision</b>
<p><b>Can you locate and name the major bones of the body?</b>            cranium, clavicle, ribs, sternum, scapula, humerus, radius, ulna, carpals, metacarpals, phalanges, pelvis, femur, patella, tibia, fibula, tarsals, metatarsals, vertebral column:</p> <ul style="list-style-type: none"> <li>• cervical</li> <li>• thoracic</li> <li>• lumbar</li> <li>• sacrum</li> <li>• coccyx</li> </ul>		
<p><b>Do you know the various types of bones and their function in sporting situations? Can you give examples of each?</b></p> <ul style="list-style-type: none"> <li>• long - movement</li> <li>• short - support</li> <li>• flat - protection</li> <li>• sesamoid - reduce friction at a joint</li> <li>• irregular - various</li> </ul>		
<p><b>Can you label the various areas of the skeleton?</b></p> <ul style="list-style-type: none"> <li>• axial Skeleton</li> <li>• appendicular Skeleton</li> </ul>		
<p><b>Can you name and describe the postural deviations?</b></p> <ul style="list-style-type: none"> <li>• neutral Spine</li> <li>• kyphosis</li> <li>• scoliosis</li> </ul>		
<p><b>Can you describe the process of bone growth using the words?</b></p> <ul style="list-style-type: none"> <li>• ossification</li> <li>• osteoblasts</li> <li>• osteoclasts</li> <li>• epiphyseal plate</li> </ul>		
<b>A2 - Function of skeletal system</b>		
<p><b>Can you name the 8 main functions of the skeleton and link to sporting examples and situations?</b></p> <ul style="list-style-type: none"> <li>• supporting framework</li> <li>• protection</li> <li>• attachment for skeletal muscle</li> <li>• source of blood cell production</li> <li>• store of minerals</li> <li>• leverage</li> <li>• weight bearing</li> <li>• reduce friction across a joint</li> </ul>		

## A3 - Joints

<p><b>Can you classify the different types of joints and give examples of each one?</b></p> <ul style="list-style-type: none"> <li>• fibrous (fixed)</li> <li>• cartilaginous (slightly moveable)</li> <li>• synovial (freely moveable)</li> </ul>		
<p><b>Can you name the main types of synovial joints and give examples of each one?</b></p> <ul style="list-style-type: none"> <li>• ball and socket</li> <li>• condyloid</li> <li>• gliding</li> <li>• saddle</li> <li>• hinge</li> <li>• pivot</li> </ul>		
<p><b>Can you name the bones that form the following joints and link to specific sporting situations?</b></p> <ul style="list-style-type: none"> <li>• shoulder</li> <li>• elbow</li> <li>• wrist</li> <li>• hip</li> <li>• knee</li> <li>• ankle</li> </ul>		
<p><b>Can you draw, label and explain the structure of synovial joints and their use in sporting techniques and actions?</b></p> <ul style="list-style-type: none"> <li>• joint capsule</li> <li>• bursa</li> <li>• articular cartilage</li> <li>• synovial membrane</li> <li>• synovial fluid</li> <li>• ligaments</li> </ul>		
<p><b>Can you list the range of movement at synovial joints? Can you explain, due to shape of articulating bones and their use in sporting actions?</b></p> <p>flexion, extension, dorsiflexion, plantarflexion, lateral flexion, horizontal flexion and horizontal extension, hyperextension, abduction, adduction, horizontal abduction and adduction, rotation, circumduction</p>		
<h3>A4 Responses of the skeletal system to a single sport or exercise session</h3>		
<p><b>Can you explain how the mineral uptake and production of synovial fluid can increase performance?</b></p>		

## A5 Adaptations of the skeletal system to exercise

Can you explain the long-term adaptations of exercise on the skeletal system and sports performance?

- increased bone strength
- increased ligament strength

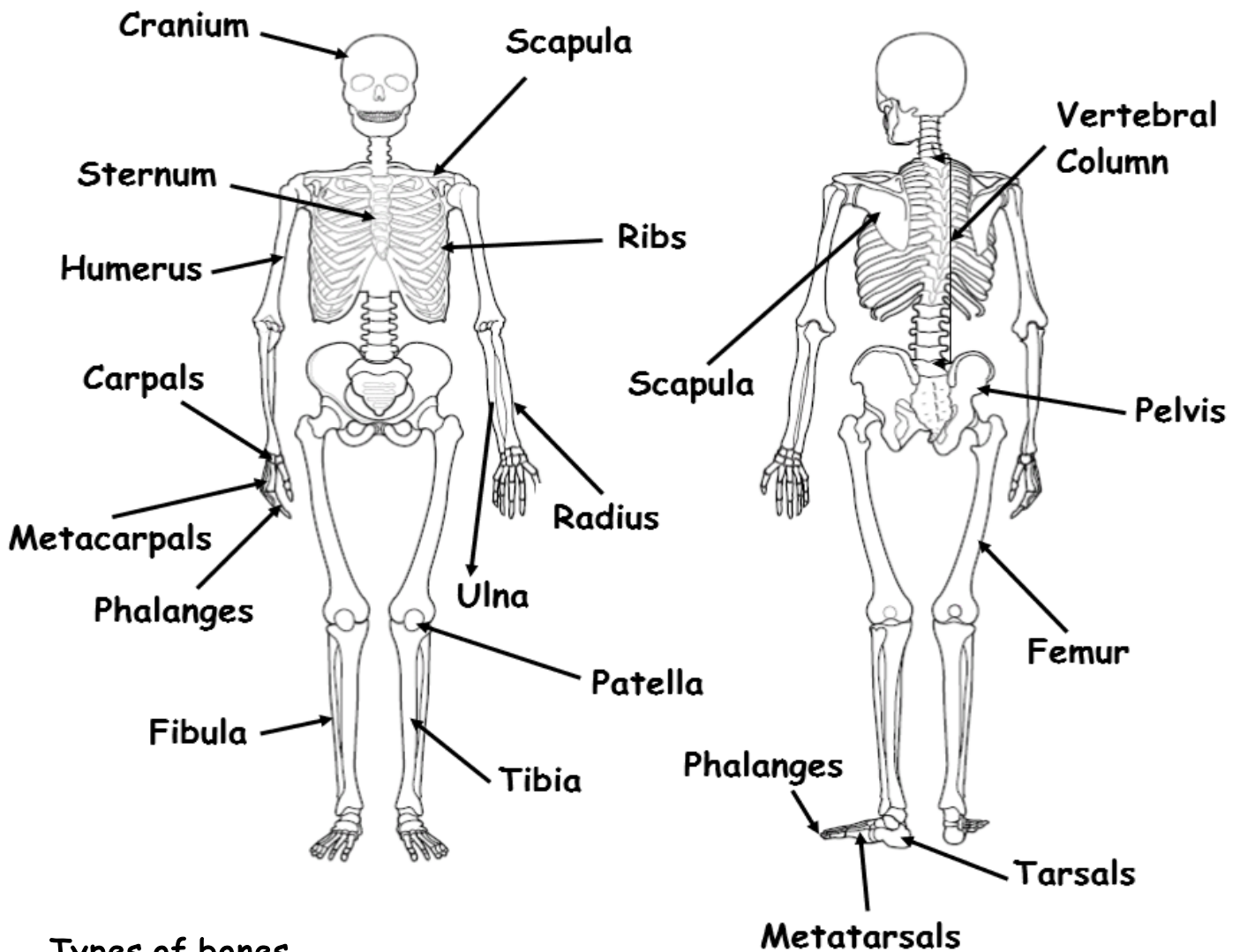
## A6 Additional factors affecting the skeletal system

Can you explain the impact of exercise and sports performance on the skeletal system?

- **Skeletal disease** - arthritis, osteoporosis, and the effect of exercise in offsetting these conditions.
- **Age** - young children and resistance training issues stunting bone growth.

# A The effects of exercise and sports performance on the skeletal system

## A1 Structure of skeletal system

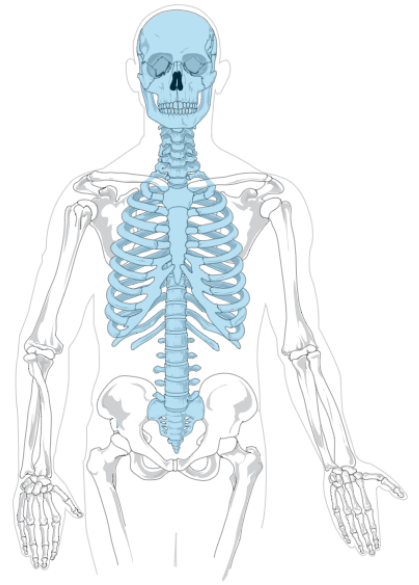


## Types of bones

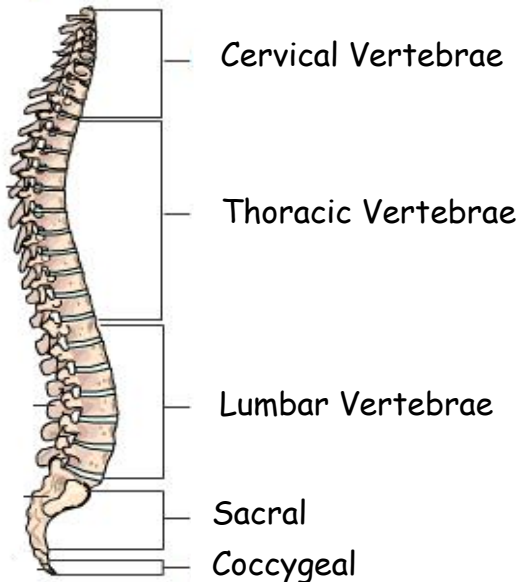
Type of bone	Characteristics	Examples
Long Bones	Longer than they are wide Act as levers to create movement Produce red blood cells	Humerus Tibia Femur
Short Bones		
Flat Bones		
Irregular		
Sesamoid		

## Areas of the skeleton

Area of the skeleton	Bones
Axial Skeleton	Is the main core or axis of the skeleton: <ul style="list-style-type: none"> <li>•</li> <li>•</li> <li>•</li> <li>•</li> </ul>
Appendicular Skeleton	Contains bones that are attached to the axial skeleton <ul style="list-style-type: none"> <li>•</li> <li>•</li> <li>•</li> </ul>



## Vertebral column



### Main Functions

- Protection of the spinal cord
- Movement
- Muscle attachment
- Attachment of ribs

Section	Function
Cervical	7 cervical vertebrae. The first two are called axis and atlas and form a pivot joint that allows the head to move, They also the attach muscles of the neck
Thoracic	
Lumbar	
Sacral	
Coccygeal	

## Postural defects

Defect	Picture	Description
<b>Neutral Spine</b>		
<b>Kyphosis</b>		
<b>Scoliosis</b>		

## Process of bone growth





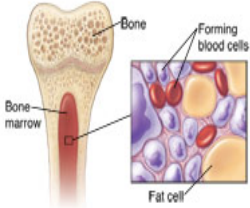


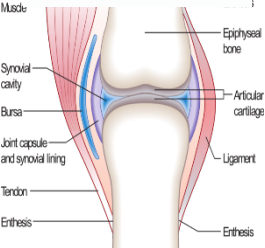
Bone is a living organ that is continuously being reshaped through a process called remodelling. **Ossification** is the process in which bones are formed. Throughout this process parts of the bone are reabsorbed so that unnecessary **calcium** is removed (via cells called **osteoclasts**) while new layers of bone tissue are created.

The cells that bring the calcium to your bones are known as **osteoblasts** and are responsible for creating bone matter. Osteoblast activity increases when you exercise, so your bones will become stronger the more exercise you do. This means your bone calcium stores increase to cope with the demand for calcium, so exercising also reduces the risk of osteoporosis. Activities that can build stronger bones include tennis, netball, basketball, aerobics, walking and running.

The ends of each long bone contain growing areas - or plates - which allow the bone to grow longer. This continues throughout childhood until they reach full maturity. These areas are called the **epiphyseal plates** and allow the long bones to extend. Once a long bone is fully formed, the head - or end of each bone - fuses with the main shaft (diaphysis) to create the **epiphyseal line**



## A2 Functions of skeletal system

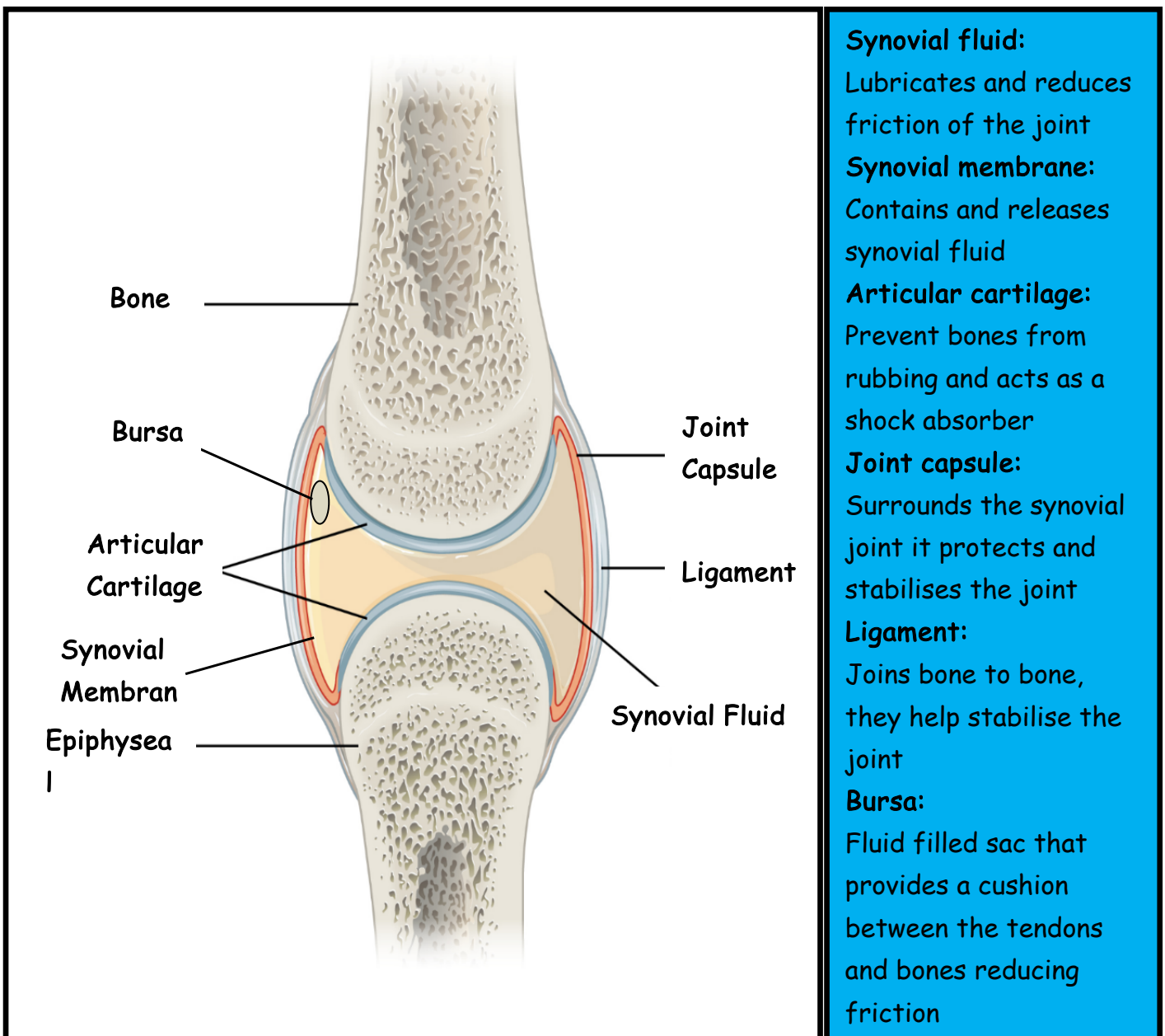
Function		Explanation
Protection		The skeleton protects vital organs: <ul style="list-style-type: none"> <li>•</li> <li>•</li> <li>•</li> </ul>
Attachment for Skeletal Muscle		
Leverage		
Storing of Minerals		
A Source of Blood Cell production		
Support Framework		
Weight Bearing		
Reduce friction Across a Joint		

## A3 Joints

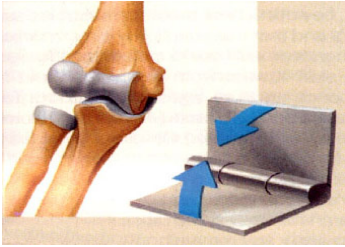

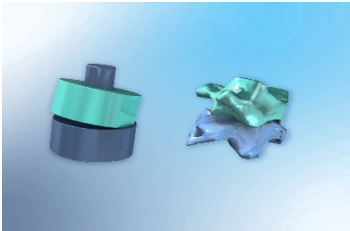
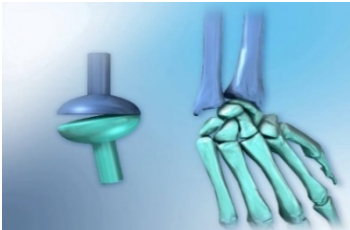
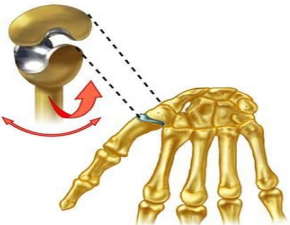
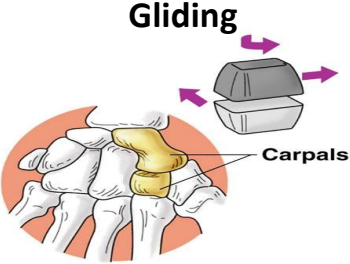
### Classification of joints

Type of Joint	Characteristics	Examples
Fixed Joint (Fibrous)	These joints are fixed and allow no movement	Cranium Sacrum Coccygeal
Slightly Moveable (Cartilaginous)	These joints are slightly moveable	Between the individual vertebrae
Moveable (Synovial)	These are freely moveable joints. The shape of bones determines the range of movement	Elbow (hinge) Shoulder (ball & socket) Thumb (saddle)

### Structure of synovial joints



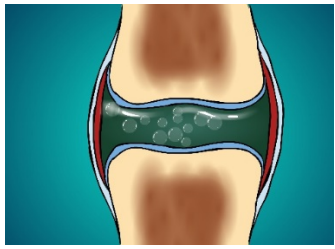

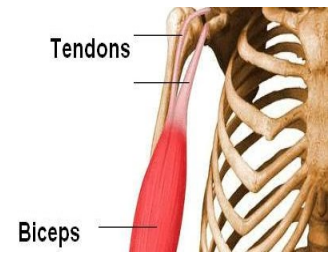
## Types of Synovial joints

Type of joint	Where found in the skeleton	Types of movements	Bones involved
<b>Hinge</b> 	Knee & Elbow  Ankle		Knee:  Elbow:  Ankle:
<b>Ball and socket</b> 	Shoulder & Hip		Shoulder:  Hip:
<b>Pivot</b> 	Neck		Cervical vertebrae:
<b>Condyloid</b> 	Wrist		Wrist:
<b>Saddle</b> 	Thumb		Thumb:
<b>Gliding</b> 	Hands & Feet		Hands:  Feet:

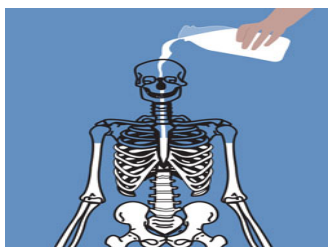

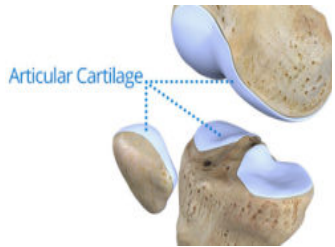
## Types of movement at synovial joints

Joint Action	Explanation	Example
Flexion	Reducing the angle between the bones of a limb at a joint: muscles contract, moving the joint into a bent position.	Bending the elbow Bicep curl
Extension		
Dorsi-Flexion		
Plantar-Flexion		
Lateral Flexion		
Horizontal Flexion & Extension		
Hyper Extension		
Abduction		
Adduction		
Horizontal Abduction & Adduction		
Rotation		
Circumduction		

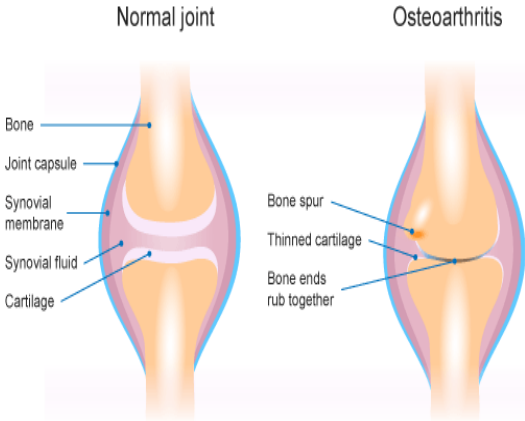
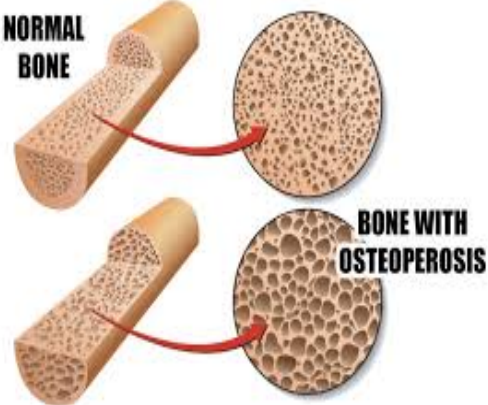

**A4 Responses of the skeletal system to a single sport or exercise session (immediate/short-term)**

Response		Explanation
Synovial fluid production		
Uptake of minerals		
Increased pliability of ligaments		

**A5 Adaptations of the skeletal system to exercise (long-term)**

Response		Explanation
Increase in bone density and strength		
Increased ligament strength		
Increased thickness of articular cartilage		

## A5 Additional factors affecting the skeletal system

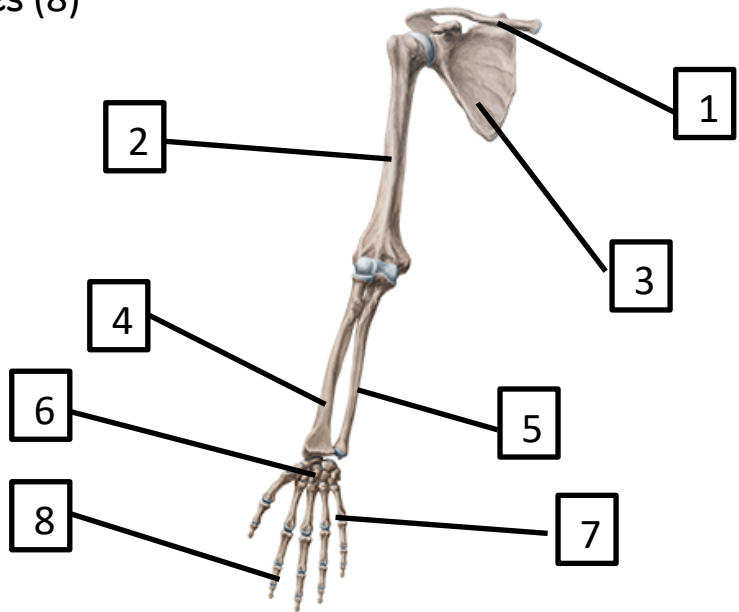
Factor	Explanation
<p style="text-align: center;"><b>Arthritis</b></p> 	<p>Arthritis is a condition where there is an inflammation within a synovial joint, causing pain and stiffness in the joint. The most common type of arthritis is osteoarthritis. This is caused by general wear and tear over a long period of time. This reduces the normal amount of cartilage tissue, which may result in the ends of the bones rubbing together.</p> <p>However, regular exercise can prevent arthritis. During physical activity your joints will produce more synovial fluid which will not only improve the joint lubrication, reducing friction between the bones, but will also provide important minerals to the cartilage.</p>
<p style="text-align: center;"><b>Osteoporosis</b></p> 	<p>Osteoporosis is the weakening of bones caused by a loss in calcium or a lack of vitamin D. As you get older your bones slowly lose their mineral density and naturally become brittle, fragile and more likely to break under stress. However, physical activity and exercise can help prevent osteoporosis by promoting increased uptake of minerals within the bones, resulting in an increase in bone mineral density. Resistance training and weight bearing exercise is a good method of preventing osteoporosis as overloading the skeleton will increase bone density.</p>
<p style="text-align: center;"><b>Age</b></p> <p style="text-align: center;"><b>Stunted Growth</b></p> 	<p>The skeletal system is a living tissue that is constantly growing and repairing itself so that it can provide support and protection. Generally, exercise and sports will benefit you. The exception to this is resistance training (weight training) in children as this can cause more harm than good. The reason for this is that a child's bones are still growing and putting too much force on them can damage the epiphyseal plates which are found at each end of the long bones. Damage to these plates during childhood and puberty can result in stunted bone growth.</p>





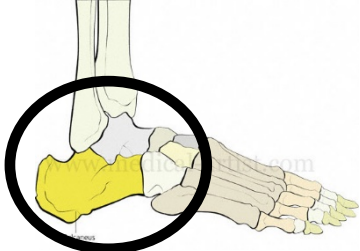
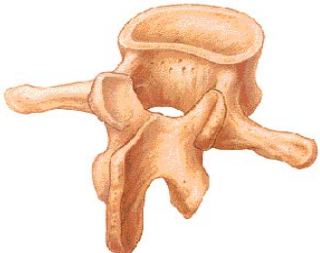
# BTEC - End of Unit Test (Skeletal System)

1. Identify the following Bones (8)

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.



2. From the pictures identify the bone and the type of bone? (4)

	<p>Bone:</p>
	<p>Bone:</p>
	<p>Bone:</p>
	<p>Bone:</p>

Type of Bone:

Type of Bone:

Type of Bone:

Bone:

Type of Bone:

3. Match the following words to their description? (5)

Sacrum	Thoracic	Coccygeal	Lumbar	Cervical
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	These are the smallest of the vertebrae, the top two are called the axis and atlas.
	These vertebrae are found in the middle of the vertebral column and attach the ribs.
	These are the largest of the movable vertebrae, they support the weight and attach muscles.
	These are 5 fused vertebrae that sits in between the pelvis, it helps support the weight.
	These are 4 fused vertebrae and have no function.

4. What bones make up the axial skeleton? (2)

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5. From the picture below name the postural deviation and give a brief description? (3)

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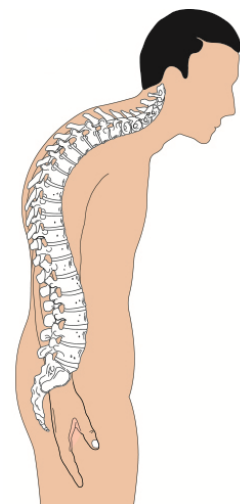
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6. Explain the process in which bones grow? (3)



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7. Explain how the following functions of the skeleton are important in a netball match? (4)

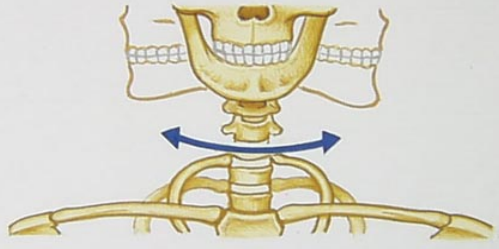

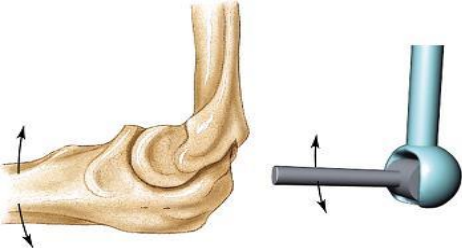


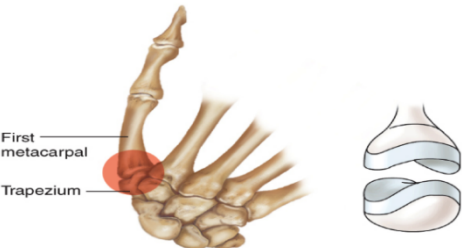


Support	
Protection	
Blood Cell Production	
Storage of Minerals	

8. What are the three classifications of joints? (3)

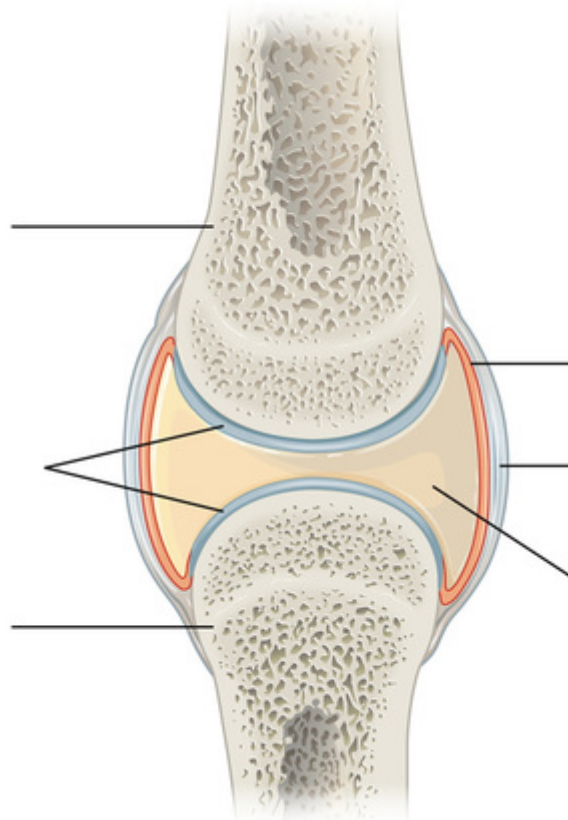
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9. From the pictures below identify the type of joint and give an example of where it can be found in the body? (6)

	<p>Type:</p> <p>Found:</p>
	<p>Type:</p> <p>Found:</p>
	<p>Type:</p> <p>Found:</p>
	<p>Type:</p> <p>Found:</p>
	<p>Type:</p> <p>Found:</p>
	<p>Type:</p> <p>Found:</p>

10. From the words below label the Synovial joint? (6)

Bone	Epiphyseal Line	Articular Cartilage	Synovial Membrane	Synovial Fluid	Ligament
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11. Explain the function of a ligament and synovial fluid. Give a sporting example of how they aid performance? (4)

Ligament:

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Aids Performance:

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Synovial Fluid:

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Aids Performance:

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12. Fill in the table by matching the description to the range of movement? (7)

Flexion	Extension	Dorsiflexion	Plantarflexion
Lateral Flexion	Horizontal Flexion	Horizontal Extension	Hyper-Extension
Abduction	Adduction	Horizontal Adduction	Horizontal Abduction
Circumduction	Rotation		

Range of movement	Description
	The movement of bending sideways.
	Reducing the angle between bones at a joint. E.g. bending.
	Movement towards the body's vertical midline.
	Movement of pulling the toes towards the knee.
	A circular motion.
	Movement of bringing your arm across your body.
	A movement beyond the normal anatomical position in a direction opposite to flexion.
	A circular motion that results in a conical motion.
	Straightening of a limb to increase the angle at a joint.
	Movement of pointing the toes downwards.
	Bending the elbow while the arm is held out.
	A movement away from the body's midline.
	Movement of bringing your arm backwards from across your body.
	Straightening the elbow while the arm is held out.

13. From the pictures below identify the highlighted joint action, the type of joint and name the bones that make up the joint? (4)



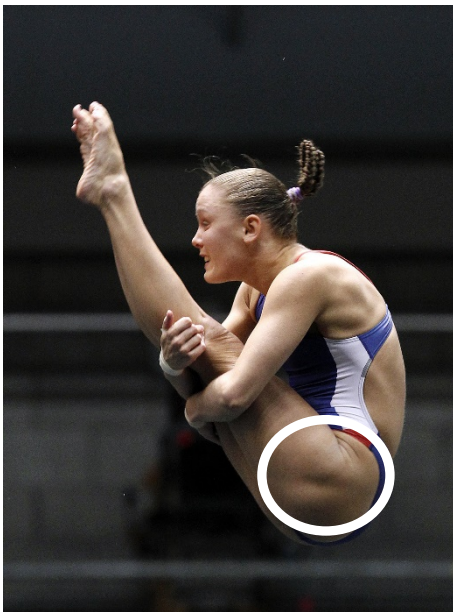
### Knee Joint

Type of joint: \_\_\_\_\_

Joint Action: \_\_\_\_\_

Bones that make up the joint:

- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_



### Hip Joint

Type of joint: \_\_\_\_\_

Joint Action: \_\_\_\_\_

Bones that make up the joint:

- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

14. Explain the response to the skeletal system when warm-up up ready to play sport? (3)

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15. Explain the long-term adaptations to exercise on the skeletal system? (3)

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16. Tom has the first stages of osteoporosis. He has been advised to take part in exercise to help prevent his condition. Identify one type of exercise that tom could take part in to prevent the osteoporosis from getting worse Explain how exercise can help prevent osteoporosis? (1)

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17. Explain how weight bearing exercise can help prevent osteoporosis? (2)

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18. Julie has been diagnosed with arthritis, her doctor has prescribed physical activity. Explain how exercise can help with arthritis? (2)

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19. Jason is twelve years old, he has started weight training at the local gym, explain the dangers on the skeletal system of weight training at an early age? (2)

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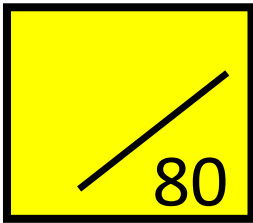
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## Self-Assessment

- You are now going to assess your work
- Fill in any incorrect answers in *Green* pen
- Give yourself a score below



## Self-Assessment

Write a short post it note on your knowledge of the skeletal system. What are your strengths and what are your weaknesses?

