Medium Term Plan
Human Skeleton

P levels
Performance attainment targets (P scales) and performance descriptors are used for pupils aged 5 to 16 with special educational needs (SEN) who are working below the standard of the national curriculum tests and assessments. PSTT recognises that the national curriculum levels used in this document are no longer current. We have had so many requests to return these materials to the website that they remain in the documents as a guide for those who have used them in the past. The written statements may be useful to others as an indication of children's development. For further information about P levels see: https://www.gov.uk/government/publications/p-scales-attainment-targets-for-pupils-with-sen

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Primary Science Teaching Trust recommends that a full risk assessment is carried out before undertaking in the classroom any of the practical investigations contained in the plans.

Safety Note
PSTT advises teachers to refer to either CLEAPSS website or SSERC website for up to date health and safety information when planning practical activities for children.

Teacher's Notes: Human skeleton

Big Questions

- What would happen if we didn't have a skeleton?
- What is a skeleton made of?
- Do the size of leg muscles effect how high a person can jump?
- Are bones alive?
- Are people double jointed?

Learning Objectives

Pupils will have opportunities:

- To explore the skeletons and its use.
- To explore muscles and how they work.

Quick review activities

- Sorting groups of bones into the correct place on a skeleton.
- Talk about the different shape bones and what their uses could be.
- Use a model to make muscles and bones and demonstrate how movement is created.
- Look at x rays

Answers

- Without a skeleton, our internal organs would be vulnerable to damage, our body would be like jelly and we would be immobile.
- A skeleton is made of jointed bones?
- The more powerful muscles are, the greater height a person could jump. There are many muscles in the leg: quads and hamstrings are your primary thrusters but if you want to jump higher, it's equally important to strengthen your calves, the muscles around your hips, and your glutes.
- Bones in our body are living tissue. They have their own blood vessels and are made of living cells, which help them to grow and to repair themselves.
- Some people are able to move their joints farther than most people can - this is called joint hypermobility or joint laxity.

Vocabulary relevant to this topic

- Skeleton – the bones inside us
- Bones – skull, hip, knee cap, rib cage, spine
- Support – to hold us up
- Move – change of position
- Protect – make safe
- Muscles – move bones
- Relax – become loose
- Contract – effort from the muscles
- Joint (Ball and Socket / Hinge joint) – where two bones meet
- Bone marrow – the soft core of a bone
- Pairs – muscles work in pairs
- Biceps – muscle on upper arm

- Purpose
- Explore
- Find
- Explain
- Investigate
- Lengthen
- Shorten
- Energy
- Exercise

Teacher's Notes: Human skeleton

Background information about this topic

- The skeleton has a range of functions:
  - to protect major body organs such as heart, lungs, brain and other parts such as the spinal cord from injury,
  - to allow movement of the body due to the flexibility of the joint (this function is related to the system of voluntary muscles within the body),
  - to provide a rigid framework for the body to support organs and soft tissues.
- Adults have 206 bones in total. Bones are hard, hollow structures. They are built from a material that is both rigid and flexible. Theywillbendinasmalldegreebeforebreaking.Theircentralareacontainsasoftsubstancecalledbonemarrowandthisis where new blood cells are manufactured.
- The skeleton is jointed to allow movement to occur. There are a variety o fjoints in the skeleton. Two of the commonest are: ball and socket joints – the enlarged ball-shaped end of one bone swivels in the cup-shaped end of another bone, e.g.hip and shoulder joints; hinge joints – this type of joint is similar to that of a door and only allows movement to occur in one plane, e.g. elbow and knee joints.
- Around joints the bones are connected by flexible ligaments; these hold the bones in their correct jointed position. The human skeletal system could not provide movement if it did not work in harmony with the muscular system. The muscles that are attached to the bones via the tendons are called skeletal muscles. Muscles are a type soft tissue made up of fibres. When the fibres contract the muscles shortens. Skeletal muscles can only pull in one direction. For this reason, almost all muscles are arranged as opposing pairs. When one muscle in a pair contracts to bend a joint, its counterpart is relaxed. To straighten the joint out again, the 'relaxed' muscle must contract and pull in the opposite direction.
- The backbone or vertebral column is 33 small bones, each one called a vertebra. The vertebrae are postioned to allow bending and twisting movements to occur. All animals that have a vertebral column are called vertebrates, whilst those that don’t are called invertebrates. All animals fall into one or other of these groups.
- Some muscles have specialised jobs, e.g. cardiac muscle that contracts 7 times a minute throughout life.

Human skeleton P1-3

Objective 1: To explore the skeletons and its use.

Descriptions of intended outcomes at different levels of attainment

- Tolerates involvement in finding and touching the different bones in their body (P1i)
- Gives intermittent reactions to the activities (P1ii)
- Accepts coactive exploration of bones (P2i)
- Begins to be proactive in interactions (P2ii)
- Observes results of own actions with interest e.g. watches own limbs bending (P3i)
- Starts to show anticipation at the same part of the song or pushing with hands (P3ii)

Human skeleton P1-3

Objective 1: To explore the skeletons and its use.

Possible Activities:	Resources:
Pupils experience feeling their own bones, or the teacher moves the model skeleton and the TA helps moves the correct part of the pupils' body.	Skeleton model.

Optional activities you might like to try include:	Resources:
Experience moving bones/ part of body to song http://www.youtube.com/watch?v=e54m6XOpRgU	Access to internet
Experience using body to move in different ways e.g. crawling, rolling, making arms, legs, fingers floppy and then strong maybe to music e.g. http://www.youtube.com/watch?v=Yn3n2u1kJ98	

Points to Note:

Pupils may not be aware of bones in the body

To feel or find softly to avoid hurting themselves.

Ensure they don't touch each other in inappropriate places.
Be sensitive to moving limbs for non-mobile pupils and maybe to involve physio staff.

Human skeleton P1-3

Objective 2: To explore muscles and how they work.

Descriptions of intended outcomes at different levels of attainment

- Tolerates involvement in touching own muscles/ arms (P1i)
- Shows an emerging awareness of experiences with muscles (P1ii)
- Shows a more sustained response to feeling the muscles working and moving the bones in arm (P2i)
- Remembers learned responses over short periods e.g. pushing when presented with a different object (P2ii)
- Positively or negatively anticipates pushing or lifting objects (P3i)
- Chooses which object to push or lift (P3ii)

Human skeleton P1-3

Objective 2: To explore muscles and how they work.

Possible Activities:	Resources:
Help pupils to experience feeling the muscles above the elbow and what happens when they or TA brings hand to face, and then back down again. Experience pulling on a large elastic ring maybe whilst playing music. Some pupils could vary part of body used.	'Rainbow 'or large stretchy ring ,

Optional activities you might like to try include:	Resources:
Experience pushing on some objects	Objects to push on that are hard e.g. book, table and other objects that are softer e.g. blown up balloon, big soft ball, pillow
Experience lifting some objects	

Points to Note:

Pupils not aware bones are joined together by muscles.

Some pupils may be sensitive to having body moved

Human skeleton P4-6

Objective 1: To explore the skeletons and its use.

Descriptions of intended outcomes at different levels of attainment

- Imitates adult in miming activity (P4i)
- Follows a simple step-by-step procedure by putting post it notes on a joint (P4ii)
- Responds to simple scientific questions about skeleton e.g. can you show me a bone? (P5i)
- Uses resources with increasing independence (P5ii)
- Responds to simple scientific questions needing a more detailed response than P5 e.g. can you find another joint in your body? (P6i)
- Matches the parts of skeleton to the name (P6ii)

Human skeleton P4-6

Objective 1: To explore the skeletons and its use.

Possible Activities:	Resources:

Optional activities you might like to try include:	Resources:

Points to Note:

Human skeleton P4-6

Objective 2: To explore muscles and how they work.

Descriptions of intended outcomes at different levels of attainment

- Mimics the movement of muscles (P4i)
- Explores pushing and lifting using any sensory mode (P4ii)
- Responds to instructions involving more than one step (P5i)
- Identifies where changes have taken place (P5ii)
- Recognises the terms contract and relax (P6i)
- Makes sensory based comparisons of muscles (P6ii)

Possible Activities:	Resources:
Watch video clip from BBC Broadband Learning Zone – 'Muscles needed for movement' - http://www.bbc.co.uk/learningzone/clips/muscles-needed-for-movement/2305.html Teacher and TA to demonstrate the movement of muscles in pairs using the words 'contract' and 'relax'. Pupils should then mimic the movements of the teacher and TA. (Use push and pull movements). Experience pushing on different objects with different part of the body. Can they feel muscles working?	Video clip, IWB, projector, speakers, internet access. Objects to push on e.g. wall, table, books, chair, box, balls, RV1: Internet access, IWB, speakers . RV2: Internet access, IWB, speakers, objects to lift e.g. food packages, books, vegetables, safety mat and or box with cushioning in

Human skeleton P4-6

Objective 2: To explore muscles and how they work.

Optional activities you might like to try include:	Resources:
Recreate movement of muscles working in pairs by sitting with feet/ knees touching and holding hands. Then pupils should move to mimic 'contract' and 'relax' just like muscles. Help them, notice that as one contracts/ stretches the other relaxes/ is less stretched Sing a muscles/ skeleton song and ask pupils to mimic you	Video clip, IWB, projector, speakers, internet access. Objects to push on e.g. wall, table, books, chair, box, balls, RV1: Internet access, IWB, speakers . RV2: Internet access, IWB, speakers, objects to lift e.g. food packages, books, vegetables, safety mat and or box with cushioning in
Show video clips to younger pupils and encourage younger pupils to mimic actions in video. Pupils watch the clip and mimic the 'muscle man's' movements. Pupils stand in pairs back to back and lean forwards and backwards to mimic antagonistic actions. Experience lifting some different objects with different parts of the body . Can they feel muscles working?	

Points to Note:

Pupil may think muscles are just on their own i.e. not attached to anything.
They may also think they have no muscles when they are small.

Gentle movement so not to pull muscles.

Lift objects safely e.g. use mat underneath and no lifting above the head.

Human skeleton P7-8

Objective 1: To explore the skeletons and its use.

Descriptions of intended outcomes at different levels of attainment

- Responds to simple scientific questions needing a more detailed response than P5 e.g. can you find another joint in your body? (P7i)
- Matches the parts of skeleton to the name (P7ii)
- Recognises some obvious bones and where they are found on the body (P8i)
- Matches the part of the skeleton to its role (P8ii)

Possible Activities:	Resources:
Match different bones to a large body outline on the floor Listen to the song on http://www.youtube.com/watch?v=ICwLlrQKVcg Pupils to make simple skeletons to put inside puppets to make them stand up. Show pupils list of jobs placed round the room, e.g. grow, shrink, move, support, protect, breathe. Pupils to collect the three jobs they think a skeleton does. Read Funny bones by Allan Ahlberg	Large outline of human body on floor, models or life size pictures of bones, internet access, puppets, cardboard and thin strips of wood, glue, scissors. Cards with different jobs on for pupils to collect, copy of Funny bones book

Human skeleton P7-8

Objective 1: To explore the skeletons and its use.

Optional activities you might like to try include:	Resources:
Pin the bone on the skeleton. (blindfold and spin around the pupils before allowing them to attach). Use a model heart and lungs for pupils to use cardboard tubes / straws to build the rib cage to show how the skeleton protects our organs.	Blindfold, parts of skeleton, full size skeleton picture, cardboard tubes, straws, staplers, glue, paper fasteners,
Work in a team to give instructions to the blindfolded student where to pin the bone on the skeleton. (e.g. up a bit, left a bit or warmer, colder etc.) Colour in a skeleton to identify the job that each part of the skeleton. E.g. different colours for protection, movement, support Create a cartoon strip using a programme like Comic life to show what would happen if there were no bones, and how the skeleton works. http://www.youtube.com/watch?v=9vlkWUPhJCw	

Points to Note:

Some know obvious bones e.g. ribs and skull and not the rest.

Make sure the area is clear so that pupils when blindfolded and spun around don't hurt themselves.
Using electrical equipment.

Human skeleton P7-8

Objective 2: To explore muscles and how they work.

Descriptions of intended outcomes at different levels of attainment

- Responds to questions requiring an informed decision e.g. how can we compare our muscles? (P7i)
- Makes simple recordings of their findings (P7ii)
- Locates some of the right equipment to use (P8i)
- Notices if something hasn't worked and tries a different approach (P8ii)

Possible Activities:	Resources:
Measure and compare arm/ leg muscles when relaxed and contracted. Pupils could design their own push and pull movements to show how muscles 'contract' and 'relax'. Pupils should shout out 'contract' when they are contracting and 'relax' when they are relaxing. Make a simple arm model http://www.ehow.com/how_6762730_build-muscle-model.html Or simple model hand http://www.sciencekids.co.nz/projects/modelhand.html	Tape measures or tape to wrap round arm Rulers, pencils and chart to record.. card, scissors, string, stapler, card board tubes, tennis ball,

Optional activities you might like to try include:	Resources:
You could use a model skeleton and then stick plasticine onto the muscles to represent the muscles. Pupils to make their own arm using two pieces of cardboard and elastic bands.	Skeleton outline, plasticine, Cardboard cut outs shaped of upper and lower arm, elastic bands, tape and scissors.

Human skeleton P7-8

Objective 2: To explore muscles and how they work.

Points to Note:

Pupils do not know terms contract and relax.

Pupils make think that muscles work on their own, and not be aware of pairs of muscles working together.

People say they have no muscles when they are small.
Muscles can stretch.

Pupils to be gentle when touching own body.
Awareness of how to use scissors.

Human skeleton L1-3

Objective 1: To explore the skeletons and its use.

Descriptions of intended outcomes at different levels of attainment

- Experiences different ways to answer questions e.g. makes models, explores owl pellets, compares x rays (L1i)
- Shows an understanding of comparative language
- e.g. more, less, bigger, smaller (L1ii)
- Recognises technological development that help us e.g. x rays (L1iii)
- Presents evidence in an ordered way (L2i)
- Makes comparisons between the features of bones and joints (L2ii)
- Uses simple scientific vocabulary to describe their observations/ findings (L2iii)
- Communicates observations of a range of skeletons e.g. size, shape (L3i)
- Uses scientific forms of language when reporting on findings (L3ii)
- Represents things in the real world using physical models e.g. flick books or card tubes for bones (L3iii)

Human skeleton L1-3

Objective 1: To explore the skeletons and its use.

Possible Activities:	Resources:
Show pupils pictures or x-rays of skeletons of humans and different animals. Pupils use split pins and put them in their model skeletons to show where joints are and then label the joints. Dissect owl pellets to find bones from different animals or watch film clip: https://www.barnowltrust.org.uk/barn-owl-facts/barn-owl-pellet-analysis/ Make 'flick books' to show movement http://www.youtube.com/watch?v=iExiCGV7jzI. Pupils talk about how different joists work. Hinge, ball and socket, using their flick books as prompts	Pictures or x rays of human and different animal skeletons, split pins, cut out cardboard skeletons to assemble, joint labels, petri dishes, owl pellets, gloves, tweezers, identification sheet if appropriate, internet access, note pads for flick book,

Human skeleton L1-3

Objective 1: To explore the skeletons and its use.

Optional activities you might like to try include:	Resources:
Match the animal to the skeleton. Compare an X-ray of an adult and a baby hand. Pupils to describe in pairs to the rest of the group what they have observed. Pupils to circle arms and describe what is happening to the bones. Why is this not the same movement as when we bend and flex our muscles? Use the skeleton to show the two main joints and word cards to introduce names 'ball and socket' and 'hinge' joint	Various X-rays of hands, feet, skulls from an adult and small child to compare pictures of animals and skeletons.
Picture of skeletons of different types of mammals for pupils to match names to. Pupils to match pictures of joints to the correct part on a large cut out of a body or skeleton on the floor. Use some of the following science words to talk about joints:- Bones, Muscles, Joint Pairs Move Relax Contract Soak chicken bones in vinegar for a few days and compare then to unsoaked bones Look at bones and the fact they are not solid. Investigate the strength of tubes.	

Human skeleton L1-3

Objective 1: To explore the skeletons and its use.

Points to Note:

All skeletons are the same and have the same number of bones.

Bones are the same in pupils and adults.

Owl pellets are not excrement but still need to be handled safely e.g. wear gloves. They can be purchased from local bird sanctuaries or online

If possible arrange a visit from someone who has had a joint replacement (e.g. knee, hip). Or even had a metal pin in place to hold the bones together.

Human skeleton L1-3

Objective 2: To explore muscles and how they work.

Descriptions of intended outcomes at different levels of attainment

- Responds to prompts by making simple suggestions on how to find an answer or make observations (L1i)
- Uses non standard measures to record results (L1ii)
- Suggests solutions to some obvious hazards e.g. when jumping (L1iii)
- Identifies things to observe or measure that are relevant to the question (L2i)
- Takes standard measurements with help (L2ii)
- Says what happened in their experiment (L2iii)
- Says what they are going to keep the same – but recognises that can't be a fair test with living things (L3i)
- Makes systematic accurate observations and whole number measurements (L3ii)
- Suggests improvements to working methods (L3iii)

Possible Activities:	Resources:
Pupils to practice and explain what happens when the doing a standing jump from a line on the floor. Pupils to record how far each child in the group can jump and make observations or find any patterns in how far pupils can jump related to the size of feet or their height. Pupils to record their observations and measurements to show what they have found to other members of the group. Show pupils a chicken leg and how muscles are attached by tendons Find out which finger has the strongest muscle (e.g. push on scales or lift weights)	Line drawn on floor and tape measure. Prepared graphs for pupils to complete with support, chicken legs, dissecting kit, bathroom scales, slotted masses, safety tray to hold masses above

Human skeleton L1-3

Objective 2: To explore muscles and how they work.

Optional activities you might like to try include:	Resources:
Investigate of the person with the longest legs can jump the highest Pupils to record the height of the jump and relate to their height. Talk about what happens to muscles when they exercise. Then get them to hold their hands down by their sides and open and close hands for 30 secs and count how many times they can manage it. Then repeat with hands above their head. Talk about how it felt – it is harder for blood to pump above the head.	Paper to stick to the wall to record height on
Use a low weight dumbbell (or tin of beans) and see how many times they can do a bicep curl in a minute. Pupils to record how many bicep curls they completed in a minute and record the circumference of their upper arm.	

Points to Note:

Pupils may say the bigger the child the longer the jump.

Bending the knees when jumping to avoid jarring.