

M-Care: Musculoskeletal Fly-through Script

1. This is the human, musculoskeletal system.
2. Fasten your seatbelts as we journey through the amazing world of muscles and bones that make up the human body.
3. We enter the skull through the right ear.
4. The brain is housed and protected in the large space inside the skull.
5. The brain is the body's control centre. It is responsible for every process that regulates our body including thought, memory, emotion, touch, vision, breathing, hunger, temperature and movement.

6. As we exit through the left eye socket we will see that our model reveals bone structure on one side and the muscles, tendons and ligaments that connect the bones, and allow them to move, on the other.

7. We are now travelling up the left arm starting at the fingers.

Slide 1 – Fingers

8. In this close-up we see three sets of bones that make up the hands and wrist:
 - the phalanges;
 - the metacarpals;
 - and carpals.
9. Each hand and wrist has 27 bones.
10. There are 14 digital bones called phalanges, three per finger and two in each thumb.
11. There are five bones in the palm of each hand – one for each digit – called metacarpals.
12. The wrist is made up of eight bones called carpals.
13. The diagram shows where the wrist connects to the radius and ulna – the bones of the forearm.
14. Human hands are incredibly sophisticated tools.
15. The large number of bones allow us to manipulate objects in a variety of complex ways.
16. This diagram illustrates the joints found in the hand and wrist.

17. As we pass the radius and ulna bones which form the forearm, we see the elbow joint.

Slide 2 – Elbow, synovial joint

18. This is where they connect to the bone of the upper arm – the humerus.
19. Bones are linked together at joints which allows the skeleton to move.
20. Fibrous, connective tissue called ligaments connect the bones together.
21. Ligaments are flexible and elastic, allowing movement.
22. This kind of joint is called a synovial joint.
23. The end of the bones are covered with a tough, smooth substance called cartilage.
24. This in turn is surrounded by synovial fluid which acts as a lubricant and stops the bones rubbing against each other.
25. The elbow is an example of a hinge joint, so called because it only moves in one direction.

Slide 3 – Elbow joint, movement

26. Hinge joints are controlled by pairs of muscles called antagonistic muscles, which work together to control the movement.

27. Muscles work by a process called contraction where they get shorter and pull the bone in one direction.
28. In the elbow the bicep and the tricep work as a pair to move the joint in opposite directions.
29. The bicep contracts to bend the arm and the tricep contracts to extend the arm.
30. You can feel the muscles working in this way on your own arm as you bend and extend it.

31. We now enter the rib cage. This huge cavity houses and protects the heart and the lungs.
32. There are twelve pairs of ribs which connect to the front to the sternum – the hard bone in the middle of your chest.
33. At the back they connect to the spine.

34. Circling round past the shoulder joint, an example of a rotating joint, you can see where the top of the humerus sits inside the cuff of the scapula, or shoulder blade. And you can see the collarbone, or clavicle, at the front which connects to the scapula.

35. Here, we can see the spine running down the back of the body, otherwise known as the backbone.

Slide 4: Spine

36. The spine is the body's main supporting structure.
37. The spinal column is made up of 33 vertebrae – the individual bones that link together to protect the spinal cord.
38. The spinal cord carries messages from the brain to the rest of the body and is a vital part of the nervous system.
39. The spine has four sections:
 - the cervical,
 - thoracic,
 - lumbar
 - and sacrum.
40. The top 24 bones in the spine can move. However, the bones in the sacrum and coccyx are fused together.

41. As we travel from the base of the skull down the spine, we can see how it naturally curves out around the back of the rib cage, in at the base of the back and out again around the back of the pelvis to the coccyx.

42. As we move in and out of the pelvis we catch glimpses, from below, into the main body cavity formed by the rib cage.

43. Here we see the joint where the femur – or thigh bone – connects with the pelvis.

Slide 5: Pelvis

44. This is an example of a ball and socket – or rotating – joint.
45. The ball-shaped, rounded end of the femur sits inside the cup shaped socket.

Slide 6: Hip Joint Muscles (front view)

46. The hip joint is supported by a complex arrangement of muscles which enable the leg to move in a wide range of ways.

Slide 7: Hip Joint Muscles (rear view)

Slide 8: Leg Movements

47. These movements are described as:

- Abduction; when the leg lifts out to the side and adduction; where it moves back to centre.
- Flexion, when the leg moves out in front of the body and extension when it returns.
- And circumduction (or rotation) when the leg moves in a circular motion.

48. As we move down the leg we follow the femur to the knee.

49. The knee is a hinge joint like the elbow.

Slide 9: Knee Joint

50. At the front of the knee is the patella – or kneecap – a flat, rounded-triangular bone which articulates with the femur and protects the joint.

51. As we move around the knee we can see the ligaments that secure the muscles to the bones.

52. Here we see how the hamstring muscle connects with the fibula and where the quadriceps muscle connects with the patella.

53. Tendons hold the patella in position.

54. Tendons and ligaments have different purposes.

55. Ligaments are fibrous connective tissues which attach bone to bone, and usually serve to hold structures together and keep them stable.

56. Tendons attach muscles to other structures, such as bones or eyeballs, and serve to *move* the bone or structure.

57. Finally, we travel down the shin bones – the tibia and fibula – and arrive at the feet.

58. We can clearly see the complex arrangement of bones, ligaments and tendons which make up the feet.

59. Each foot comprises 26 bones, and over a hundred muscles, tendons and ligaments.

Slide 10: Feet

60. They all work together to provide support, balance and mobility for the body.

61. Thanks for joining us on this journey around the human Musculoskeletal System. We're sure you'll agree, it's fascinating stuff!

62. You can also try our other fly through experiences: the Cardiovascular System and the Digestive system.