Summary of Adaptations for Bipedalism

Position of the foramen magnum	Moved from the back to the centre of the skull – this allows the skull to balance on top of the spine and less energy expenditure is required by the muscles in the neck to keep the skull upright.
Position of the occipital condyles (the part of the skull that articulates with the vertebral column)	They have moved from the back of the skull to the middle of the skull to keep keeping the head above the centre of gravity
Rib cage	Flattened **from front to back** which moves the centre of gravity closer to the spine. This improves balance.
Spine shape	Changed from 'C' shape to 'S' shaped. This allows the weight of the chest to sit above the pelvis, rather than further forward. This improves both balance and it absorbs the shock of walking.
Pelvis shape	The pelvis has become more bowl shaped (broad and short). This results in:- (a) Improved balance (b) The support of the upper body (c) Enlarges the valgus angle. The bowl-shaped pelvis also increases the surface area for the attachment of large buttock muscles (gluteus maximus).
Femur length and shape	Femur is stronger, **longer** and angled inwards from the hip so that the knees nearly touch (increased valgus angle). This assists the upper body to be positioned above the centre of gravity for walking. Overall the legs are longer than the arms in humans.
Knee joint	The bottom of the femur (the knee joint) has a buttress of bone called the lateral condyle, that stops the sideways deflection of thigh muscles during walking.
Shape of the foot	The foot has changed in two main ways: - (a) The foot has changed to become a platform. The toes are short, with the big toe beside the others and forward thrusting (ie it is non-opposable). The foot has lost all grasping ability. (b) The weight is placed on the outer edge with the inner side elevated into an arch. This provides a shock absorber effect and a spring that facilitates long distance travelling.