Support, Movement and Locomotion P2 questions

12. Support, movement and locomotion

Content

12.1 Bones

12.2 Joints

12.3 Antagonistic muscles

Learning outcomes

Candidates should be able to:

(a) identify and describe, from diagrams, photographs and real specimens, the main bones of the forelimb

(humerus, radius, ulna and scapula) of a mammal

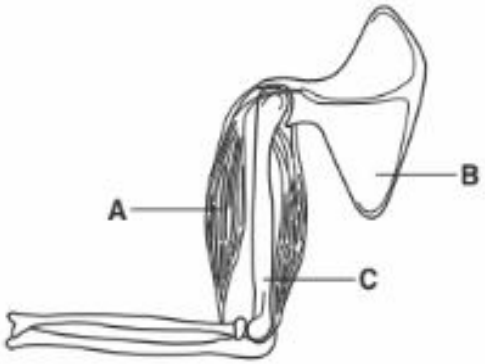
(b) describe the type of movement permitted by the ball and socket joint and the hinge joint of the forelimb

(c) describe the action of the antagonistic muscles at the hinge joint.

Support, Movement and Locomotion P2 questions

O/N18/21/Q3

The diagram shows the arrangement of bones and muscles in the arm.



(a) **(i)** Name each of the following:

A .....

B .....

C ..... [3]

(ii) Identify the hinge joint on the diagram, by using a label line and the letter **H**. [1]

(iii) Describe how the type of movement of a ball and socket joint differs from that of a hinge joint.

.....

..... [1]

(b) The contraction of muscle **A** to raise the lower part of the arm requires energy. This energy may be provided by aerobic respiration.

(i) State the equation, in words or symbols, for aerobic respiration.

..... [2]

(ii) Explain why a person may feel pain in muscle **A** if the arm is raised and lowered a number of times quickly.

.....

.....

..... [2]

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(iii) Suggest and explain what would happen to the time taken for the person to feel pain in muscle **A** if the arm was raised and lowered while holding a heavy object in the hand.

.....

.....

.....

.....

..... [3]

[Total: 12]

Support, Movement and Locomotion P2 questions

O/N17/22/Q5

Muscles are arranged around joints in pairs. One muscle contracts to bend a limb at a joint, and the other contracts to straighten it.

(a) (i) State the term for muscles that act in this way .....[1]

(ii) Name the muscle in your arm that contracts to move your hand away from your nose after smelling a flower.

.....[1]

(b) Fig. 5.1 shows how muscles are arranged in the human leg and pelvis, and also shows the leg in two different positions, R and S.

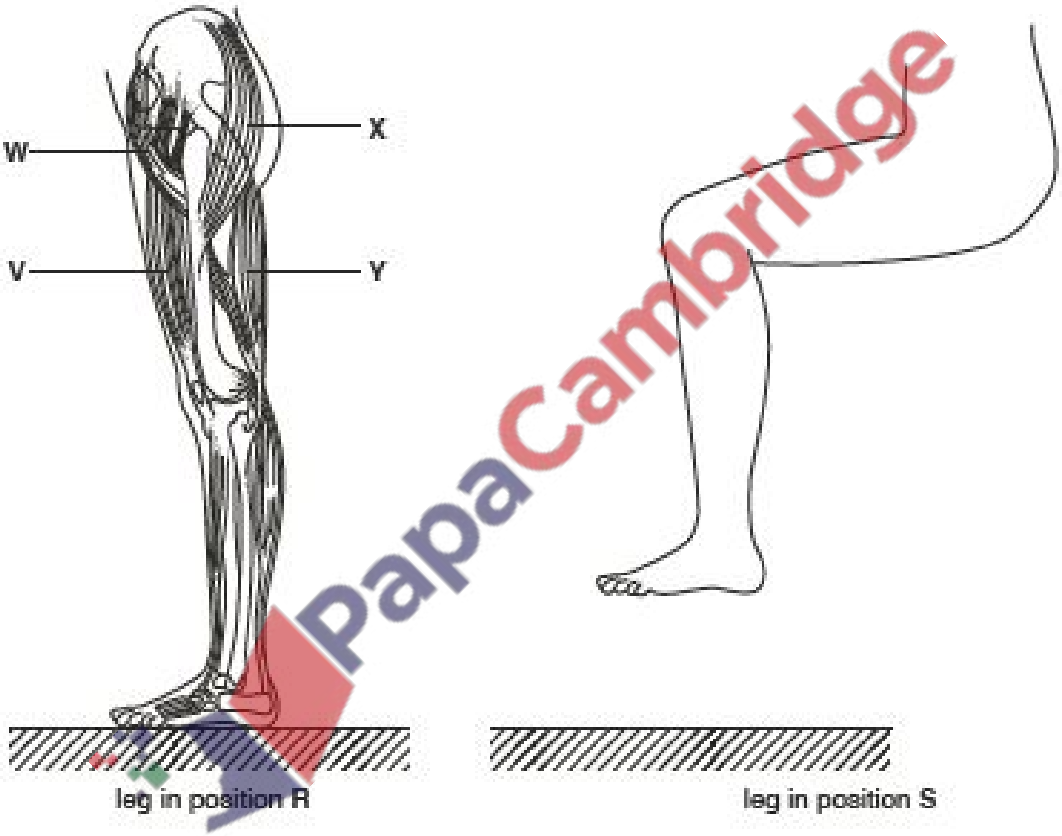

Fig. 5.1

(i) Using the letters in Fig. 5.1, identify the two muscles that contract to move the leg off the ground from position R to position S.

..... and ..... [2]

(ii) State what happens to the other muscles in Fig. 5.1 during this action.

.....[1]

..

(c) Describe how a similar arrangement of muscles in the eye helps vision in dim light.

.....

.....

.....

.....

.....

.....[3]

[Total: 8]

Support, Movement and Locomotion P2 questions

O/N16/21/Q3

Fig. 3.1a is a diagram of the human skeleton. Fig. 3.1b is an X-ray that shows damage to part of a person's skeleton.

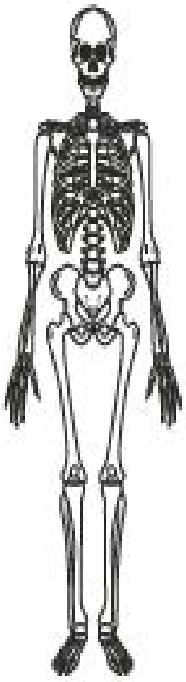

Fig. 3.1a

Fig. 3.1b

(a) (I) Draw the letter X on Fig. 3.1a to show the location of the damage to the person's skeleton that is shown in Fig. 3.1b.

[1]

(II) Describe the damage to the person's skeleton shown in Fig. 3.1b.

.....

.....

.....

..... [2]

Support, Movement and Locomotion P2 questions

(b) Fig. 3.2 shows the arrangement of bones and muscles in part of a person's body.

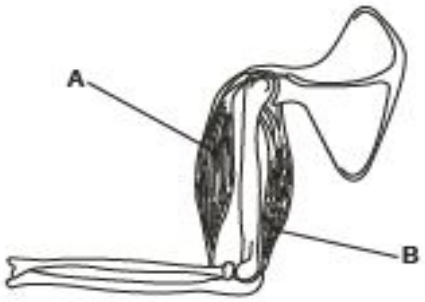

Fig. 3.2

(I) Name the muscle labelled **B** in Fig. 3.2.

..... [1]

(II) Draw an arrow on Fig. 3.2 to show the direction of movement that will be caused when the muscle labelled **B** contracts.

[1]

(III) When the muscle labelled **B** contracts, the muscle labelled **A** relaxes. State the term that refers to a pair of muscles that act in this way.

..... [1]

(c) Fig. 3.3 shows the approximate percentage of body mass that is due to the skeleton in birds and in humans.

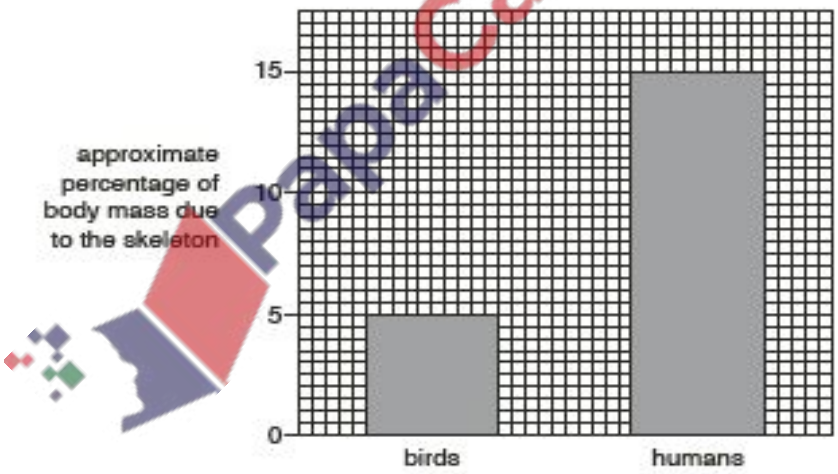

Fig. 3.3

Support, Movement and Locomotion P2 questions

(I) Use the information in Fig. 3.3 to compare the approximate percentage of body mass that is due to the skeleton in birds and in humans.

.....

..... [1]

(II) One reason for this difference is that the bones of a bird contain air spaces. These air spaces are connected to the lungs of the bird.

The blood of birds contains more haemoglobin per unit volume than that of humans.

Suggest how these adaptations, and that shown in Fig. 3.3, help a bird to move by flying.

.....

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.....

.....

.....

.....

.....

.....

..... [4]

[Total: 11]

Support, Movement and Locomotion P2 questions

O/N13/21/Q2

(a) Muscles that move bones at joints are arranged in pairs.

(i) State the term used to describe such a pair of muscles.

..... [1]

(ii) Explain why muscles are arranged in this way.

.....

.....

.....

.....[3]

(iii) Name a muscle in the human body that is **not** arranged as one of a pair.

.....[1]

(b) Name **two** different types of joint found in the arm. For each joint, state exactly where in the arm it is found.

1 type of joint ..... where found .....

2 type of joint ..... where found ..... [2]

Support, Movement and Locomotion P2 questions

Fig. 2.2(a) shows an X-ray of the shoulder joint. Fig. 2.2(b) shows an X-ray of a shoulder with an artificial replacement joint.

Fig. 2.2(a)

Fig. 2.2(b)

(c) Using evidence from Fig. 2.2(a) and Fig. 2.2(b), suggest why the type of replacement joint shown in Fig. 2.2(b) is known as a 'Reverse Shoulder Replacement'.

.....

.....

.....

.....[3]

[Total: 10]

Support, Movement and Locomotion P2 questions

Mark Scheme

Mark schemes will use these abbreviations:

; separates marking points

/ alternatives

() contents of brackets are not required but should be implied

R reject

A accept (for answers correctly cued by the question, or guidance for examiners)

Ig ignore (for incorrect but irrelevant responses)

AW alternative wording (where responses vary more than usual)

AVP alternative valid point (where a greater than usual variety of responses is expected)

ORA or reverse argument

underline actual word underlined must be used by candidate

+ statements on both sides of the

+ are needed for that mark

O/N18//21/Q3

3(a)(i) (A) biceps ;

(B) scapula / shoulder blade ;

(C) humerus ;

3(a)(ii) hinge joint correctly identified ; 1

3(a)(iii) rotation / more than one plane AW ; 1

3(b)(i) glucose / C6H12

O6 + oxygen / 6O2 ;

carbon dioxide / 6CO2 + water / 6H2O ;

3(b)(ii) anaerobic (respiration) / lack of oxygen ;

lactic acid ;

3(b)(iii) (time taken) would decrease / pain quicker ;

more muscle activity / muscle works hard(er) ;

more energy ;

more anaerobic (respiration) ;

more lactic acid

O/N17/22/Q5

5(a)(i) antagonistic **; 1**
5(a)(ii) triceps **; 1**
5(b)(i) W **;**
Y **;**
2
5(b)(ii) relax **; 1**
5(c) **1** (muscles) in iris **;**
2 radial **+** contract **;**
3 circular **+** relax **;**
4 pupil **+** wider / dilates / expands **AW ;**
5 more light **;**
6 retina / rods / cones / photoreceptors **AW ;**

O/N16/21/Q3

3(a)(i) **X** drawn on left / right humerus of skeleton **;**
3(a)(ii) humerus / bone / arm **;**
broken **AW ;**
3(b)(i) triceps / extensor **;**
3(b)(ii) arrow down from above / below lower arm bones i.e. to left of elbow **;**
3(b)(iii) antagonistic **;**
3(c)(i) 3 · larger **+** humans / 3 · smaller **+** birds / ratio 1:3 / ratio 5:15 **;** must have correct reference to birds and / or humans
3(c)(ii) reduced weight **;**
fly further / faster **;**
more energy efficient **AW ;**
more / sufficient oxygen available / carried by the blood / in the bones **;**
as oxyhaemoglobin **;**
(for aerobic) respiration **;**
(release) more / enough energy (for it to fly) **;**
(to use for) muscle **+** contraction **;**

O/N13/21/Q2

2 (a) (i) antagonistic;
(ii) one muscle contracts;

while the other relaxes;
muscles can only contract / only pull / never push;
one muscle causes a change, the other restores the position AW; e.g. so the action can be reversed.
A for max 1 muscles can contract
+ relax
A oppose one another
(iii) ciliary muscle / sphincter muscle or any named / heart / diaphragm;
(b) In either order :
hinge + elbow / position described;
ball and socket + shoulder / position described;
A any correct, the two listed are on the syllabus
(c) ball + on scapula / shoulder blade;
socket + on humerus
normally the other way round / the reverse of normal;