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SECTION A: The Skeletal System for Sports Performance

Answer ALL questions. Write your answers in the spaces provided.

1 Complete **Table 1** by naming the **three** bones in the shoulder joint.

2 Q01

Joint	Name of bone
Shoulder	Humerus
	Scapula
	Radius

Table 1

(Total for Question 1 = 3 marks) **2**

Carmen is a long jumper. The functions of different bone types are vital to ensure that she can participate in the long jump. Two of these bone types are short bones and sesamoid bones.

2 Explain how short bones **and** sesamoid bones support Carmen when performing the long jump.

2 Q02

Short short bones support the weight of the body
for example the tarsals in the ankle. The tarsals will ~~be~~ help
Carmen when she lands at the end of the long jump. It
will support her ankle ~~by~~ long supporting the weight of her body.
Sesamoid ~~se~~ these bones are covered in cartilage and are held
together with tendons like the patella. This will help to
support the knee when Carmen takes off for the
jump and when she lands.

(Total for Question 2 = 4 marks) **2**



P 8 1 1 4 1 A 0 3 2 0

Figure 1 shows a gymnast on the beam.



Figure 1

3 (a) (i) State the movement taking place at the ankle joint circled in Figure 1.

(1)1 Q03ai

plantar flexion

(ii) State the type of joint found at the ankle.

(1)1 Q03aii

Hinge joint.

(b) State the movement taking place at the shoulder joints in Figure 1.

(1)1 Q03b

a Abduction



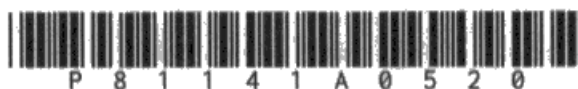
(c) Explain why the ligaments in the knee are important when the gymnast lands from the beam.

(3)3 Q03c

Ligaments are tough fibrous flexible tissue that connects bones together. This will for the knee to remain stabilised while landing on the beam. Because the ligament in the knee stabilises the joint it will help prevent dislocation from occurring when landing on the beam.

(Total for Question 3 = 6 marks) **6**

TOTAL FOR SECTION A = 13 MARKS



P 8 1 1 4 1 A 0 5 2 0

SECTION B: The Muscular System for Sports Performance

Answer ALL questions. Write your answers in the spaces provided.

Figure 2 shows the muscles in the upper body.

4 Identify the muscles labelled **A–C**.

3 Q04

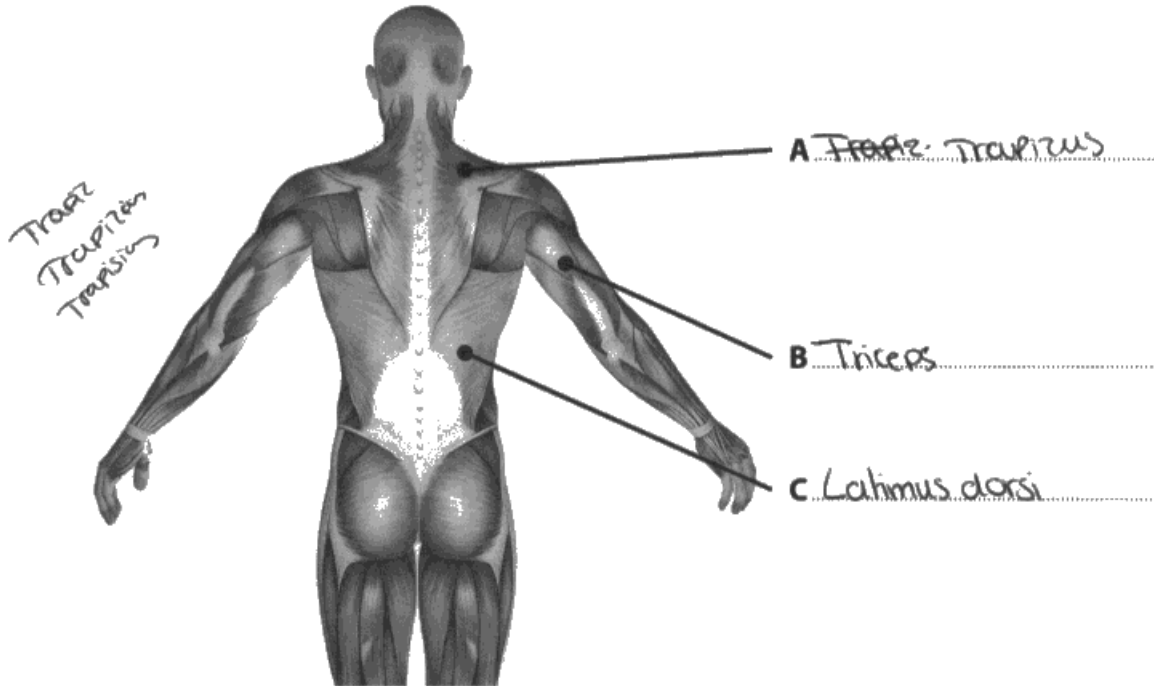


Figure 2

(Total for Question 4 = 3 marks)

3

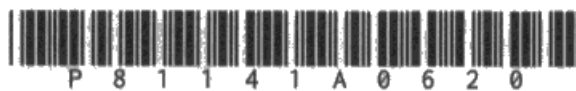
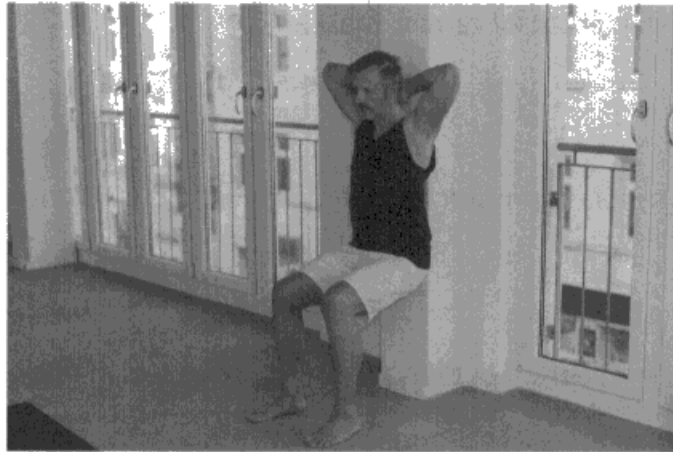


Figure 3 shows Dave performing a wall sit.



(Source: © stockfour/Shutterstock)

Figure 3

5 Describe the type of muscle contraction taking place in Dave's quadriceps when he performs a wall sit.

2 Q05

is Isometric Contraction. This is because the muscles in the quadriceps are remaining the same length and ~~but~~ tension is being produced.

(Total for Question 5 = 2 marks) **2**

There are three muscle fibre types: Type I, Type IIa and Type IIx.

6 Explain the main fibre type used in long-distance running.

3 Q06

Type I. This has a dense capillary network and high levels of ~~myoglobin~~ myoglobin. It also has the highest resistance to fatigue out of all fiber types. This ~~will allow~~ ~~along distance~~ it is used for aerobic activities. This will allow long distance runners to sustain their performance for longer because more oxygen is ~~reaching~~ reaching the working muscles.

(Total for Question 6 = 3 marks) **3**



One characteristic of cardiac muscle is that it is involuntary.

7 (a) State **one other** characteristic of cardiac muscle.

(1)1 Q07a

myogenic

(b) State **one** reason why it is important that cardiac muscle is involuntary.

(1)0 Q07b

It will allow blood to continue to flow to vital organs

Priya is a cyclist. Over a long period of time, Priya's muscular system has adapted causing an increase in myoglobin stores.

(c) Explain the impact of an increase in myoglobin stores on Priya's performance in a cycling race.

(3)3 Q07c

myoglobin acts as an energy store in the muscles. An increase in myoglobin stores means that more oxygen can be transported to the mitochondria, which results in more energy being produced. This allows more oxygen to be transported to the working muscles, allowing Priya to sustain her performance for a longer period of time.

(Total for Question 7 = 5 marks) 4

TOTAL FOR SECTION B = 13 MARKS



SECTION C: The Respiratory System for Sports Performance

Answer ALL questions. Write your answers in the spaces provided.

Figure 4 is an incomplete flow diagram of the route that air passes through when breathing in.

- 8** Identify the **three** respiratory structures needed to complete the flow diagram shown in **Figure 4**. 2 Q08

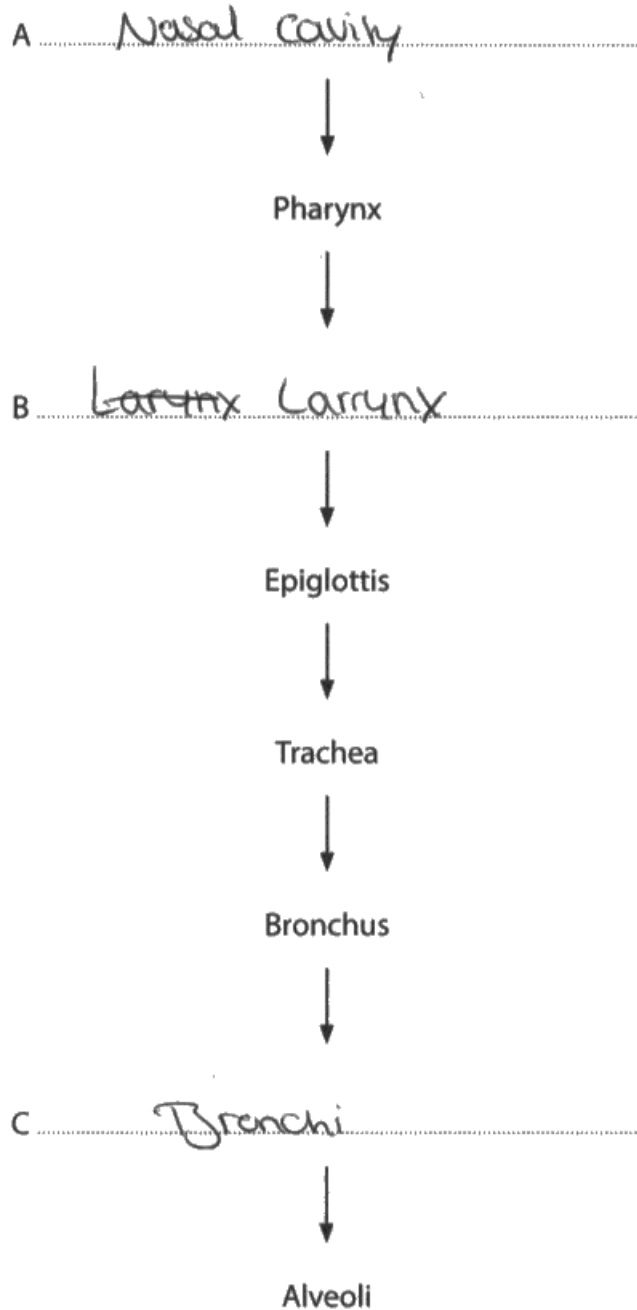


Figure 4

(Total for Question 8 = 3 marks) 2



9 (a) Describe how the medulla oblongata increases breathing rate during exercise.

(2)1 Q09a

It detects ~~detects~~ and increase in blood acidity and an increase in ^{Carbon dioxide} ~~Carbon dioxide~~. It will speed up the messages sent to the respiratory muscles to contract to increase breathing rate.

(b) (i) Describe the process of diffusion of carbon dioxide at the alveoli.

(4)2 Q09bi

~~Carbon dioxide~~ ~~Carbon dioxide~~ will ~~not~~ ~~diffuse~~ into the ~~lining~~ of the ~~alveoli~~. The capillaries will carry the deoxygenated blood. Where the blood is low in oxygen but high in CO_2 . It will then pass the ~~alveoli~~ where blood is high in oxygen but low in carbon dioxide and now the blood will be high in oxygen and low in ~~Carbon~~ Carbon dioxide.

(ii) Describe the role of the internal intercostal muscles during expiration when exercising.

(2)0 Q09bii

It will expand raising the ribs up and out. This will cause the lungs to also expand allowing more air to ~~be~~ be breathed in. This is to meet the demands of exercise oxygen needed for exercise.



Dexter is a hockey player. He has completed a continuous training programme over a number of weeks. He now runs for 45 minutes, five times a week.

His training has led to an increase in the oxygen diffusion rate at his muscles.

(c) Assess the effect of an increase in oxygen diffusion rate at his muscles on Dexter's hockey performance.

(6)4 Q09c

Increased oxygen diffusion rate increase the efficiency of the diffusion of oxygen. This results in more oxygen being transported to the working muscles providing Dexter with more energy to last him throughout his hockey match. ~~Dexter has more energy, will be able~~ by having more oxygen/energy available Dexter will be able to sustain his performance for longer while still being at a high intensity, he will also be able to work at an optimum level for longer. It will also ~~increase~~ increase the efficiency of the transportation of nutrients around the body, as well as waste products. If oxygen diffusion rate has increased then the carbon dioxide diffusion rate must have also increased ~~leading~~ this will prevent carbon dioxide from building up.

(Total for Question 9 = 14 marks) **7**

TOTAL FOR SECTION C = 17 MARKS



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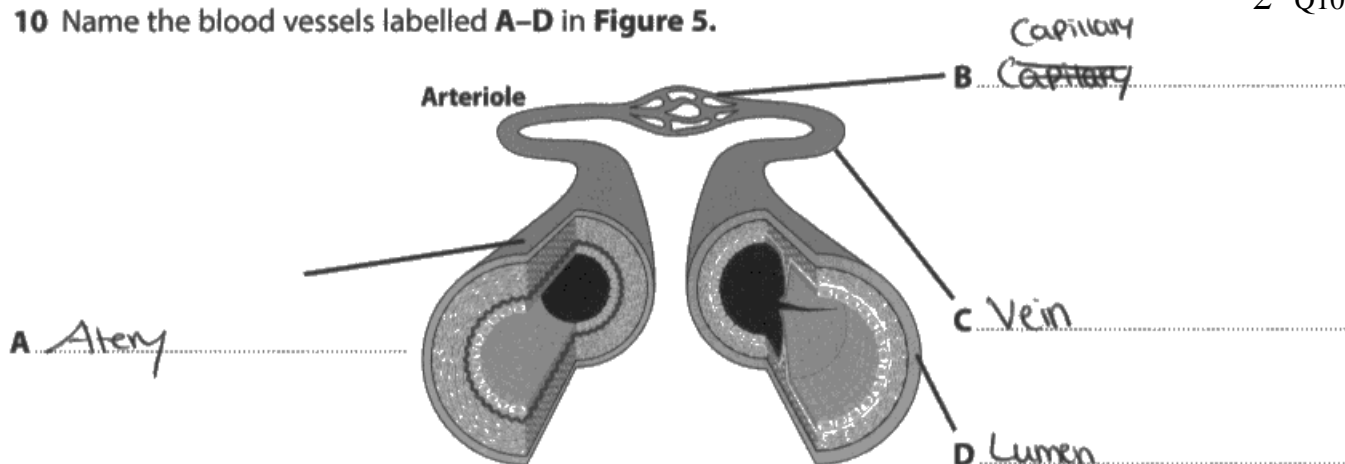
SECTION D: The Cardiovascular System for Sports Performance

Answer ALL questions. Write your answers in the spaces provided.

Figure 5 shows the various types of blood vessel.

2 Q10

10 Name the blood vessels labelled **A–D** in **Figure 5**.



(Source: © Blamb/Shutterstock)

Figure 5

(Total for Question 10 = 4 marks) **2**



Emma is a netballer. During a match some of her blood vessels vasodilate.

11 (a) Explain why vasodilation helps Emma perform in the netball match on a very hot day.

(2)1 Q11a

it will help Emma's body to cool down so she does not overheat.

During the match, one response of Emma's cardiovascular system is redirection of blood flow. ^{Capillarisation}

- redirection of blood flow
- ↑ COP
- SV

(b) State **three other** responses of the cardiovascular system during the match.

(3)3 Q11b

- 1 Increased Cardiac output
- 2 Increase in heart rate
- 3 Increase blood pressure.

(Total for Question 11 = 5 marks) **4**

12 Describe the role of the tricuspid valve in the cardiac cycle.

right atrium

2 Q12

It is to push deoxygenated blood from the right atrium to the right ventricle. And to stop the backflow of blood.

(Total for Question 12 = 2 marks) **2**



Leah is a footballer. She relies on her cardiovascular system to allow her to play a full match.

5 Q13

13 Analyse the flow of blood as it returns to the heart through the vena cava until it is pumped out to the body **and** how this helps Leah last the full match.

deoxygenated blood comes through the venacava then to the right atrium. From here it then travels through the tricuspid valve then into the right ventricle. From here the blood will enter the ~~semi~~ semi-lunar valve then into the pulmonary artery to go to the lungs to be oxygenated. Oxygenated blood comes back from the lungs through the pulmonary vein. Oxygenated blood then goes into the left atrium then into the bicuspid valve then into the left ^{ventricle} atrium. Blood then enters the semi-lunar valve then enters the aorta which takes the now oxygenated blood into the body. This helps Leah to get enough oxygen to her working muscles so she can sustain her performance for longer periods of time. It also helps waste products like carbon dioxide ~~and lactate~~ to ^{be} taken to the lungs to be breathed out. And lactate is taken to the liver where it is sweated out or urine. This will prevent waste products building up which can also help Leah to avoid fatigue again allowing her to maintain a high level performance at an optimum level for longer.

(Total for Question 13 = 6 marks) **5**

TOTAL FOR SECTION D = 17 MARKS



SECTION E: Energy Systems for Sports Performance

Answer ALL questions. Write your answers in the spaces provided.

14 State the **two** by-products of the electron transport chain.

0 Q14

1 Carbon dioxide.

2 ~~hydro~~ hydrogen.

(Total for Question 14 = 2 marks) **0**

15 Describe the process of **anaerobic glycolysis**.

2 Q15

This is the process when glucose is broken down without oxygen. When the lactate system has depleted the anaerobic glycolysis kicks in and breaks down liver and muscle glycogen in order to produce energy, energy for exercise. The breakdown of glycogen will produce 3 ATP molecules, allowing ATP to be replenished.

(Total for Question 15 = 4 marks) **2**



P 8 1 1 4 1 A 0 1 5 2 0

Erin is a rugby player. She has been training for five years. Over this time her aerobic energy system has adapted.

16 Assess the impact of adaptations to the aerobic energy system on Erin's rugby performance.

1 Q16

Erin's aerobic energy system is able to work more efficiently because the continuous training this can result in more energy being produced by Erin's aerobic energy system allowing Erin to sustain her performance for a long period of time. It will also allow her to work at low intensities for longer as well as higher. Erin's energy system aerobic energy system is able to increase the usage of its ~~own~~ fats - allowing fat oxidation / to combustion to ~~provide~~ ^{providing} Erin with additional amounts of energy which can be used in the final stages in the aerobic energy system. Allowing Erin to still maintain an optimum level of performance throughout the game.

(Total for Question 16 = 6 marks) **1**

TOTAL FOR SECTION E = 12 MARKS



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QUESTION 17 BEGINS ON THE NEXT PAGE.

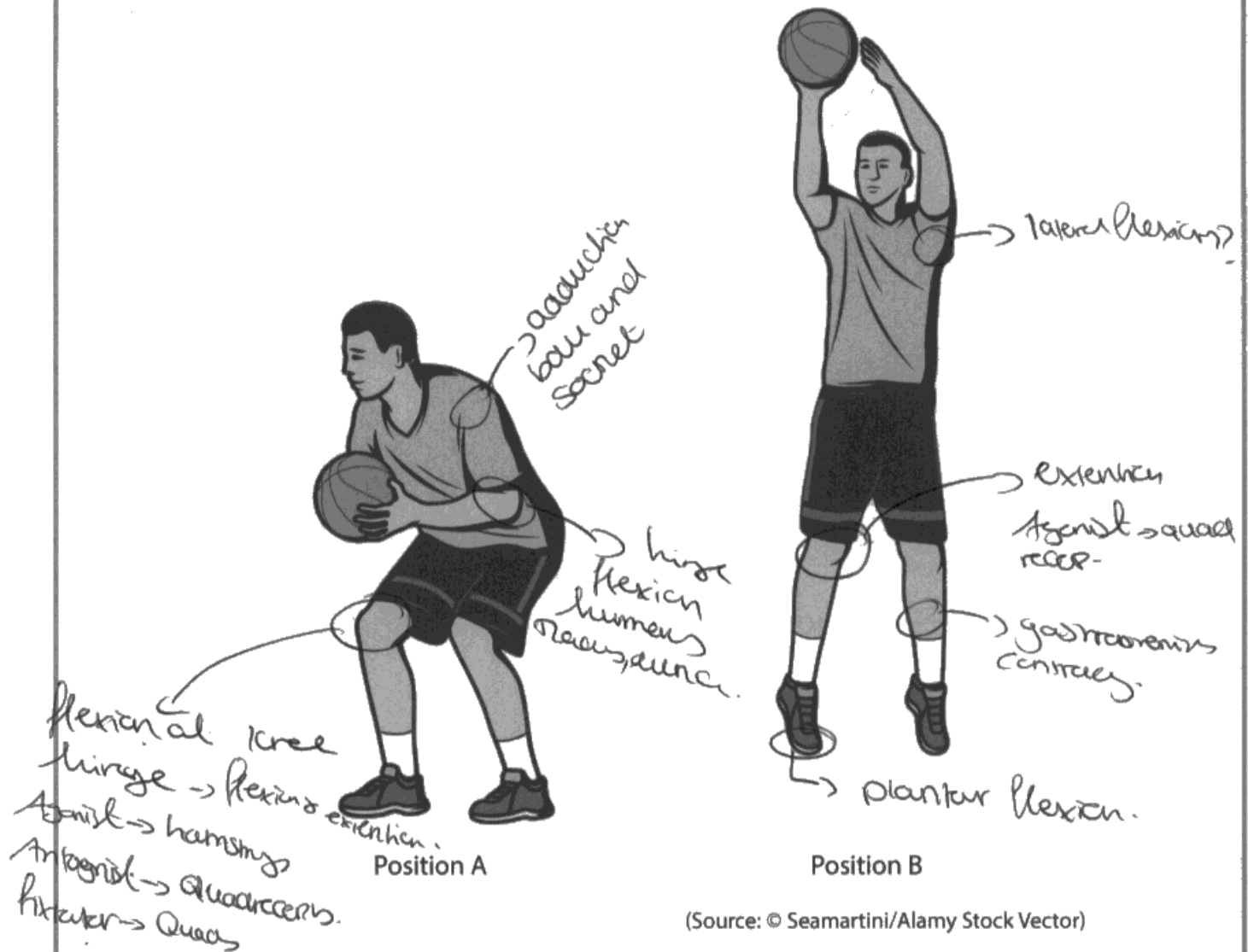


SECTION F: Interrelationships between Body Systems for Sports Performance

Answer the question. Write your answer in the space provided.

Josh is a basketballer.

Figure 6 shows the preparation phase (position A) and the shooting phase (position B) of his jump shot.



(Source: © Seamartini/Alamy Stock Vector)

Figure 6

17 Analyse how the skeletal and muscular systems interact to enable movement of the knee, hip and elbow from position A to position B in **Figure 6**.

(8)4 Q17

In position A flexion is occurring at the knee joint (hinge joint). The agonist is the hamstring as it is causing Josh's knees to bend. And the antagonist is the quadriceps and the fixator would



be the tibia and fibia for the quadriceps. The humerus
Femur is a long bone allowing for leverage to occur.
~~The elbow joint is a hinge joint. Flexion is also occurring~~
~~at this joint. The agonist is the biceps and the hamstring~~
muscle is contracting concentrically. The elbow joint is a hinge joint
and flexion is also occurring at this joint. The agonist is the
biceps which is contracting concentrically because the biceps
is shortening. And the antagonist is the triceps. At the
Shoulder is the ball and socket joint where the greatest
greatest range of movement occurs (The tibia patella is a
sesamoid bone which helps) which is held together by tendons
which stabilise the joint. Adduction is occurring at this joint.
~~Causing Josh to head the ball~~ because he is heading
The ball ~~is~~ towards the midline of the body. In position
B) at the ankle (a hinge joint) plantar flexion is occurring
when Josh goes at attempts to shoot. The gastrocnemius
is contracting causing the tibia anterior to be the antagonist.
At the knee (the hinge joint) extension is occurring. The
quadriceps are the antagonist and the hamstrings are the antagonist
at the shoulder (the ball and socket joint) The serratus
Serratus is the trapezius. It is stabilising the joint by stopping the
scapula from moving when the upper arm is ^{abducted.} abducted at the
Shoulder.



(Total for Question 17 = 8 marks) **4**

TOTAL FOR SECTION F = 8 MARKS
TOTAL FOR PAPER = 80 MARKS

