Instructions

• Use black ink or ball-point pen.
• Answer all questions.
• Answer the questions in the spaces provided.

Information

• The total mark for this paper is 90.
• The marks for each question are shown in brackets.
  – use this as a guide as to how much time to spend on each question.

Advice

• Read each question carefully before you start to answer it.
• Check your answers if you have time at the end.
1 (a) Which one of the following muscle fibre types is best suited for a cyclist on a 3-hour ride?

- [ ] A Type I
- [ ] B Type IIa
- [ ] C Type IIx
- [ ] D Fast

(b) What classification of bone is shown in Figure 1?

- [ ] A Long
- [ ] B Short
- [ ] C Irregular
- [ ] D Flat
(c) Which of the following tests should be used to measure flexibility?

☐ A Cooper run
☐ B Sit and reach
☐ C Harvard step test
☐ D Vertical jump test

(d) Which of the following tests should be used to measure power?

☐ A Cooper run
☐ B Sit and reach
☐ C Harvard step test
☐ D Vertical jump test

Alan is a 16-year-old PE student. He has just completed the sit and reach test. **Table 1** shows ratings for the sit and reach test.

<table>
<thead>
<tr>
<th></th>
<th>Very Poor</th>
<th>Poor</th>
<th>Fair</th>
<th>Average</th>
<th>Good</th>
<th>Excellent</th>
<th>Superior</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>–20 cm +</td>
<td>–19 to –9 cm</td>
<td>–8 to 1 cm</td>
<td>0 to 5 cm</td>
<td>6 to 16 cm</td>
<td>17 to 26 cm</td>
<td>27 cm +</td>
</tr>
</tbody>
</table>

Table 1

(e) Alan scored 9 cm. Which of the following best describes his score?

☐ A Excellent
☐ B Good
☐ C Fair
☐ D Poor
Julia is 15, she has just undertaken the vertical jump test.

Table 2 shows normative data for height jumped.

<table>
<thead>
<tr>
<th>% Rank</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>91–100</td>
<td>76 + cm</td>
</tr>
<tr>
<td>81–90</td>
<td>71–75 cm</td>
</tr>
<tr>
<td>71–80</td>
<td>66–70 cm</td>
</tr>
<tr>
<td>61–70</td>
<td>60–65 cm</td>
</tr>
<tr>
<td>51–60</td>
<td>55–59 cm</td>
</tr>
<tr>
<td>41–50</td>
<td>50–54 cm</td>
</tr>
<tr>
<td>31–40</td>
<td>45–49 cm</td>
</tr>
<tr>
<td>21–30</td>
<td>40–44 cm</td>
</tr>
<tr>
<td>11–20</td>
<td>35–39 cm</td>
</tr>
<tr>
<td>1–10</td>
<td>30–34 cm</td>
</tr>
</tbody>
</table>

(f) If Julia scored 46 cm, which of the following best describes her percentage score rank?

- A 31–40%
- B 61–70%
- C 71–80%
- D 81–90%  

(g) Which is the correct description for vital capacity?

- A The maximum amount of air that can be breathed in or out.
- B The amount of times the heart beats in a minute.
- C The amount of oxygen you need when exercising.
- D The amount of air that enters the lungs during normal breathing when at rest.

(h) Which is the correct description for tidal volume?

- A The maximum amount of air that can be breathed in or out.
- B The amount of times the heart beats in a minute.
- C The amount of oxygen you need when exercising.
- D The amount of air which enters the lungs during normal breathing when at rest.
(i) What best describes a frontal axis?

- A  Bypasses from side to side at right angles to the sagittal plane
- B  Bypasses horizontally from front to rear lying at right angles to the frontal plane
- C  Bypasses from head to foot at right angles to the transverse plane
- D  None of the above

(j) What best describes the transverse plane?

- A  Vertical plane which passes from front to rear separating the body into right and left parts
- B  Passes from side to side at right angles to the sagittal plane, which separates the body into a front and back section
- C  Horizontal plane that separates the body into upper and lower parts
- D  None of the above

(Total for Question 1 = 10 marks)
2 Muscles work in pairs.

Using one example, explain how muscles working in pairs aid physical activity and sport.

(Total for Question 2 = 3 marks)
3  **Figure 2** shows an Association Footballer attempting to shoot at goal.

**Figure 2**

Analyse how the footballer uses both the ankle joint and hip joint to strike the football.

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

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__________________________________________________________________________

(Total for Question 3 = 3 marks)
Figure 3 shows an athlete completing a bicep curl using a dumbbell.

Identify the lever used and explain how it affects movement.

(Total for Question 4 = 3 marks)
5 Muscles work with the skeleton to bring about specific sporting movements.

Complete Table 3 by:

(a) stating the function of each muscle

(b) giving an example of a specific sporting movement that uses each muscle.

<table>
<thead>
<tr>
<th>Muscle</th>
<th>(a) Function</th>
<th>(b) Specific sporting movement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deltoid</td>
<td>(1)</td>
<td>(1)</td>
</tr>
<tr>
<td>Hamstring</td>
<td>(1)</td>
<td>(1)</td>
</tr>
</tbody>
</table>

Table 3

(Total for Question 5 = 4 marks)
6 Complete Table 4 by:

(a) stating the function of each muscle

(b) giving an example of a specific sporting movement that uses each muscle.

<table>
<thead>
<tr>
<th>Muscle</th>
<th>(a) Function</th>
<th>(b) Specific sporting movement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gastrocnemius</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bicep</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4

(Total for Question 6 = 4 marks)
Figure 4

Complete the following statements about Figure 4.

The structure labelled A in Figure 4 is the _____________________.

For the body to move, __________ needs to be supplied to the muscles. The lungs, blood and the __________, work together in a continual sequence to help the flow of oxygenated and deoxygenated blood round the body.

(Total for Question 7 = 3 marks)
8 Identify the different functions of the skeleton that can be used in physical activities and sports.

(Total for Question 8 = 3 marks)

9 Explain three different classifications of bones.

(Total for Question 9 = 3 marks)
10 Identify the **three** body planes. 

(3)

(Total for Question 10 = 3 marks)

11 Identify the **three** body axes. 

(3)

(Total for Question 11 = 3 marks)

12 Explain the principle of overload. 

(3)

(Total for Question 12 = 3 marks)
13 Explain how to improve aerobic threshold.

(Total for Question 13 = 3 marks)

14 Explain how to improve anaerobic threshold.

(Total for Question 14 = 3 marks)
15 Analyse how Pilates/yoga or an aerobics class can improve a specific component of fitness.

__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________

(Total for Question 15 = 4 marks)

16 What are the long-term effects of training on the body?

__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________

(Total for Question 16 = 3 marks)
17 Analyse the effects of EPO.

(a) Advantages:

(b) Disadvantages:

(Total for Question 17 = 4 marks)
18 Explain the aims of a warm-up.

(Total for Question 18 = 3 marks)

19 Describe three different training methods.

(Total for Question 19 = 3 marks)
20 Complete Table 5.

(a) Identify mechanical advantages of first class and second class levers.

(b) Identify mechanical disadvantages of first class and second class levers.

<table>
<thead>
<tr>
<th>Class of lever</th>
<th>(a) Advantages</th>
<th>(b) Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>First class</td>
<td>(1)</td>
<td>(1)</td>
</tr>
<tr>
<td>Second class</td>
<td>(1)</td>
<td>(1)</td>
</tr>
</tbody>
</table>

Table 5

(Total for Question 20 = 4 marks)
21 Evaluate how various performance-enhancing drugs (PEDs) can affect an athlete.

(Total for Question 21 = 9 marks)
22. Explain the long-term effects of exercise on the muscular, respiratory and cardio-vascular systems.

(a) Muscular system:

(b) Respiratory system:

(c) Cardio-vascular system:

(Total for Question 22 = 9 marks)
Practice Exam Paper 1

1. (a) \(A\) [1]
(b) \(A\) [1]
(c) \(B\) [1]
(d) \(D\) [1]
(e) \(B\) [1]
(f) \(A\) [1]
(g) \(A\) [1]
(h) \(D\) [1]
(i) \(A\) [1]
(j) \(C\)

2. Possible responses: For example, in a bicep curl the triceps brachii is the antagonist, the bicep brachii is the agonist [1]; Muscles work in antagonistic pairs/ Pairs of muscles create movement [1]; Agonist muscle shortens/muscle relaxes [1]. (1 mark for correct example, e.g. bicep and triceps causing flexion and extension – example must be included to achieve maximum marks – 1 mark for each point made, up to a maximum of 2 marks, for a total of 3 marks.)

3. Possible responses: Ankle plantarflexion and dorsiflexion creates direction/power [1]; Ball and socket joint at the hip allows leg to swing back [1]; Hip allows a greater range of movement in the body [1]; Hip movement generates more power/direction [1]; Accept any other appropriate response [1]. (1 mark for each point made, up to a maximum of 3 marks; accept any other appropriate response.)

4. Possible responses: Third class lever [1]; To move the dumbbell a large amount of effort is required [1]; Small movements of the muscles create a long lever movement [1]; Fulcrum and load are at different ends of the lever [1]; Bicep muscles provide the force and bend the forearm against the weight of the forearm [1]; Triceps muscle stabilises the movement/triceps is agonist [1]; Effort is off-centre of the lever near the fulcrum/not as effective as a second class lever [1]; The pivot is at the elbow and the forearm acts as the lever arm [1]. (1 mark for each point made, up to a maximum of 3 marks.)

5. | Muscle     | (a) Function | (b) Specific sporting movement |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Deltoid</td>
<td>Abduction</td>
<td>Press up and bench press/Accept any other appropriate response [1]</td>
</tr>
<tr>
<td>Hamstring</td>
<td>Flexion [1]</td>
<td>Leg curl/Accept any other appropriate response [1]</td>
</tr>
</tbody>
</table>

(1 mark for each point, up to a maximum of 4 marks.)

6. | Muscle      | (a) Function     | (b) Specific sporting movement |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Gastrocnemius</td>
<td>Planter flexion/point the toes [1]</td>
<td>Lunge/ Accept any other appropriate response [1]</td>
</tr>
<tr>
<td>Bicep</td>
<td>Flexion [1]</td>
<td>Bicep curls/ Accept any other appropriate response [1]</td>
</tr>
</tbody>
</table>

(1 mark for each point, up to a maximum of 4 marks.)

7. trachea [1]; oxygen [1]; heart [1].

8. Possible responses: Protection of vital organs [1]; For muscle attachment [1]; Joints for movement [1]; Production of platelets [1]; Red and white blood cell production [1]; Storage of calcium and phosphorus [1]. (1 mark for each point, up to a maximum of 3 marks.)

9. Possible responses: Long bones – are longer than they are wide/have a soft centre surrounded by a hard outer casing/are used as levers to enable the body to move/examples include the ulna and tibia, the long leg bones that are used in cycling, running and swimming [1]. Short bones – are approximately as long as they are wide/have large quantities of bone marrow to make blood vessels/are weight bearing/examples include the carpals and tarsals in the wrist and foot [1]. Flat bones – are flat and particularly strong/have muscles attached that provide protection/examples include the scapula (shoulder) and the cranium (skull) [1]. Irregular bones – All remaining bones are classed as irregular bones/they are often unusual in appearance/uses include both protection and muscle attachment/examples include the bones that make up vertebral column (spine) and mandible (jaw) [1]. (1 mark for each classification of bone explained – only one point needs to be made about each classification to gain 3 marks.)

10. Sagittal plane [1]; Frontal plane [1]; Transverse plane [1].

11. Frontal axis [1]; Sagittal axis [1]; Vertical axis [1].
12. Possible responses: Training must be to a higher intensity than previously for the body to adapt [1]; Frequency can be increased/how often training takes place [1]; Intensity of training/how hard training is/perceived levels of effort [1]; Type/altering the method used/using inclines/changing the terrain [1]; Changing time/duration [1]. (1 mark for each point, up to a maximum of 3 marks.)

13. Possible responses: Heart rate needs to be in the aerobic target zone: 60–80% [1]; Exercise at a steady state and not too fast [1]; Examples of methods to improve aerobic threshold, e.g. spinning, aerobics or any other acceptable examples [1]; Oxygen needs to be used/carbon dioxide needs to be removed [1]; Marathon runners use aerobic training or any other acceptable example of activity [1]. (1 mark for each point, up to a maximum of 3 marks.)

14. Possible responses: Heart rate needs to be in the anaerobic target zone: 80%–90% [1]; Anaerobic exercise is needed in short, fast bursts where the heart cannot supply enough oxygen to the muscles [1]; Anaerobic training is needed to improve the ability of the muscles to work without enough oxygen [1]; Working anaerobically will create an oxygen debt/only possible to exercise like this for a short period of time [1]; Oxygen debt is the amount of oxygen consumed during recovery rest [1]; Sprinters use anaerobic training or any other acceptable examples [1]; Examples of methods, e.g. interval training, fartlek training or any other acceptable examples [1]. (1 mark for each point, up to a maximum of 3 marks.)

15. Possible responses: Aerobics (class must be mentioned) [1]; Exercising to music. In a group fitness class/working your body aerobically [1]; Develops strength/flexibility and cardio-vascular endurance [1]; Advantages – Develops flexibility and cardio-vascular endurance/Good for weight loss/Improves coordination/High intensity [1]; Disadvantages – can be high impact on the body’s joints [1].
Possible responses: Pilates/yoga (class must be mentioned) [1]; Completing a variety of stretches and exercises/Pilates often focuses on the core muscles and all of the body/Used for body conditioning [1]; Develops strength and flexibility [1]; Advantages – develops strength and flexibility/targets specific muscle groups [1]; Disadvantages – stretches can be challenging/can lead to injury [1]. (1 mark for identification of fitness class, 1 mark for an explanation point, 1 mark for an advantage, 1 mark for a disadvantage; to achieve 4 marks – identification, explanation, an advantage and a disadvantage are all required.)

16. Possible responses: Increases ability to train for longer and more intensely [1]; Fitness levels are improved [1]; Motor development in skills is improved [1]; Recovery is quicker [1]; Sleep better [1]; Resting heart rate is lower/bradycardia [1]; Blood pressure is lower [1]; Reduced body fat [1]. Any other suitable response. (1 mark for each point, up to a maximum of 3 marks.)

17. (a) Possible responses: Advantages – Increased red blood cell count [1]; Increased oxygen-carrying capacity [1]; Or other relevant advantage [1].
(b) Disadvantages – Heart problems [1]; Strokes [1]; Or other relevant disadvantage [1]. (1 mark for each point made, 2 marks maximum for advantages, 2 marks maximum for disadvantages.)

18. Possible responses: Prevents injury to muscles [1]; Improves elasticity of ligaments/tendons [1]; Increases range of movement [1]; Increases temperature of muscles [1]; Increases blood flow [1]; Prepares the body for specific exercise [1]; Helps an athlete to get into a positive mindset [1]; Helps an athlete to focus [1]; Helps an athlete to relax [1]; Helps an athlete to visualise a performance going well [1]. (1 mark for each point, up to a maximum of 3 marks.)

19. Continuous – working at sustained aerobic intensity without rest, for a minimum of 20 minutes. It improves cardio-vascular fitness/endurance [1].
Fartlek – or ‘speed play’ training incorporates changing your speed, terrain or intensity. It improves speed/ aerobic/anaerobic fitness [1].
Circuits – involve performing a series of exercises in a special order, called a circuit. Each activity takes place at a ‘station’. It can be designed to improve speed, agility, coordination, balance and muscular endurance [1].
Interval – period of work and relief with varying levels of intensity. It can be used to develop speed and muscular endurance. It improves aerobic and anaerobic fitness [1].
Plyometric – sometimes called jump training. Where muscles are used to exert maximum force in short periods of time, with the aim of developing speed and strength (power). Examples include bounding, jumping and hopping [1].
Weight/resistance – uses weights to provide resistance to the muscles. It can be used to develop muscular strength. By varying weight, sets and reps, different goals can be achieved. Muscular endurance, muscular strength and power can all be developed [1]. (1 mark for each training method described, up to a maximum of 3 marks.)
20.

<table>
<thead>
<tr>
<th>Class of lever</th>
<th>(a) Advantages</th>
<th>(b) Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>First class</td>
<td>Strong/Stable/ Increasing the length of the lever will increase the mechanical advantage. [1]</td>
<td>Slow-acting movement/ Limited flexibility [1]</td>
</tr>
<tr>
<td>Second class</td>
<td>Strong/Stable/ Increasing the length of the lever arm will increase the mechanical advantage. [1]</td>
<td>Slow-acting movement/ Limited flexibility [1]</td>
</tr>
</tbody>
</table>

(1 mark for each point, up to a maximum of 4 marks.)

21.

<table>
<thead>
<tr>
<th>Marks</th>
<th>Comments</th>
<th>Example of answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>The level of response is basic and only states the positives of three performance-enhancing drugs. The response does not include any side effects or negatives of using performance-enhancing drugs. There is no conclusion and many performance-enhancing drugs are not included.</td>
<td>Individuals use performance-enhancing drugs in sport to improve their physical performance. There is a big range of substances they can use to improve performance, these include anabolic steroids, which build muscle, increase muscle mass and allow an athlete to train at higher intensity. Another method could be blood doping, which increases the oxygen-carrying capacity of the blood, which in turn means an individual can work at higher intensity with less effort. EPO provides the same benefits to a performer.</td>
</tr>
<tr>
<td>5</td>
<td>Like the previous answer, this answer identifies the performance advantages of performance-enhancing drugs, but additionally it includes some potential health risks. It includes a very brief conclusion.</td>
<td>Athletes use performance-enhancing drugs to gain an advantage and to improve their body's cardio-vascular fitness or muscular strength. Some athletes opt to use beta-blockers to help them relax before they compete; additionally it makes the cardio-vascular system work more efficiently. However, it does have some potential negative effects including affecting mental well-being and causing sleep deprivation. Using both EPO and blood doping can increase red blood cell count and increase oxygen-carrying capacity. But both of these effects carry risks of health problems including the risk of heart attack or strokes. Narcotic analgesics can be used to mask pain, but again have severe health risks and are illegal. As you can see there are many advantages and disadvantages of using performance-enhancing drugs.</td>
</tr>
<tr>
<td>9</td>
<td>This is an outstanding answer that includes coverage of all the possible performance enhancing drugs. The performance advantages and risks of these drugs are clearly highlighted, and the conclusion rounds off the argument well.</td>
<td>Even though taking performance-enhancing drugs is against the rules of sport and detrimental to an athlete's health, many athletes take the risk as the prospect of winning is so attractive. There are many different performance-enhancing drugs an athlete can use, these include EPO, narcotic analgesics, diuretics, beta blockers, human growth hormones, and anabolic steroids.</td>
</tr>
</tbody>
</table>
EPO is naturally produced in the body but it can be injected into the body using a synthetic substance to boost the blood’s red cell count and oxygen-carrying capacity; this makes significant improvements to aerobic fitness and the body’s abilities to recover. EPO does, however, have some severe side effects, including potential heart problems, and the risk of stroke is increased. Withdrawing blood and refrigerating it over several weeks and then injecting it again will have very similar performance benefits, but has the increased risk of infection occurring. Human growth hormones and anabolic steroids both have very similar benefits to an athlete, which include increased muscle mass, which then usually means greater strength and an ability to train harder and recover more quickly. There are, however, significant risks, including heart attack, depression and damage to the kidneys. Diuretics are used to help athletes lose weight, and can also be used to cover up other drugs. Diuretics, like other performance-enhancing drugs, have dangerous side effects, the most notable being the risk of dehydration. Narcotic analgesics are used to allow an athlete to train at a greater intensity and not feel the pain of doing so; these drugs can be very addictive and athletes often struggle to come off them. Beta blockers help reduce levels of stress for performers, causing the cardio-vascular system to work more efficiently. Potential negative effects include disrupted sleep, fatigue and depression. Performance-enhancing drugs have many clear benefits to the body both physiologically and psychologically. However, they are against the rules of sport, not ethical and pose significant health risks.

22. (a) Possible responses: Increased bone density – making bones stronger [1]; Increased strength of ligaments and tendons – improving joint stability, articular cartilage increases [1]; Muscle hypertrophy – muscles become bigger in size, fibres get thicker and stronger [1]; The importance of rest for adaptations to take place – without adequate rest changes will not occur [1]; It is important to allow adequate time to recover before the next training session [1]. (1 mark for each point, up to a maximum of 3 marks.)

(b) Possible responses: Increased capillarisation – a greater network of capillaries is created to assist respiration [1]; Increase in number of red blood cells, which helps with oxygen transfer to the working muscles [1]; Drop in resting blood pressure due to more elastic muscular wall of veins and arteries [1]; Increased lung capacity/volume and vital capacity – means you breathe in more oxygen, the bigger the capacity, the more air comes in [1]; Increased number of alveoli – results in more efficient gaseous exchange [1]; Increased strength of diaphragm and external intercostal muscles – results in greater force and less likelihood of fatigue [1]. (1 mark for each point, up to a maximum of 3 marks.)

(c) Possible responses: Decreased resting heart rate – as your heart becomes stronger and more efficient more blood is pumped per beat, so resting heart rate is reduced [1]; Faster recovery – after long-term training athletes are able to recover more quickly [1]; Increased resting stroke volume – more blood is pumped per heart beat [1]; Increased maximum cardiac output – more blood is pumped per minute [1]; Increased size/strength of heart – the heart becomes bigger and stronger [1]. (1 mark for each point, up to a maximum of 3 marks.)