Option D — Human physiology

20. The graph shows the responses in levels of growth hormone and free fatty acids to relatively intense exercise combining aerobic and anaerobic components.

[Key:
- growth hormone
- fatty acids in blood]

Percentage change during exercise

Time / min

0  20  40  60  80  100

[Source: adapted, by permission, from J.H. Wilmore and D.L. Costill, (2004), Physiology of Sport and Exercise, 3rd ed., (Champaign, IL: Human Kinetics), page 178]

(a) Identify the level of growth hormone after one hour of exercise.  

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(Option D continues on the following page)
(Option D, question 20 continued)

(b)  (i) State one reason that motivates some athletes to take growth hormones.  

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(ii) State one risk associated with the use of growth hormones in sports.  

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(c) Suggest one possible use of fatty acids during exercise.  

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(d) Testosterone is a steroid hormone. Outline the mechanism by which steroid hormones affect target cells.  

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21. (a) The liver produces cholesterol. State two other functions of the liver. [2]

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2. .................................................................

(b) Compare and contrast cholesterol produced by the liver and dietary cholesterol. [2]

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(Option D, question 21 continued)

(c) The CAT scan shows a patient who has a blocked bile duct.

[Source: adapted from http://upload.wikimedia.org/wikipedia/commons/4/4c/Obstructivebiliarydilation.png]

The blockage of the bile duct causes a build-up of bilirubin in the blood.

(i) State one consequence of a build-up of bilirubin in the blood. [1]

(ii) State one other possible cause for the build-up of bilirubin in the blood. [1]

(Option D continues on the following page)
(Option D continued)

22. The X-ray shows the legs of a young boy who suffers from rickets.

![X-ray image](source: www.millathomeopathy.com/images/disease-cd-rickets.jpg)

(a) State the symptom of rickets evident in the X-ray. [1]

(b) State the main cause of rickets. [1]

(c) Identify one vitamin and one hormone that are based on a steroid ring. [2]

Vitamin: ..........................................................

Hormone: ..........................................................

(Option D continues on the following page)
(Option D continued)

23. Image I represents a normal heart rhythm and image II represents an abnormal heart rhythm.

![Image of heart rhythms]

[Source: adapted from www.homeheart.co.uk/eeg_example.jpg]

(a) State the name given to the abnormal rhythm pattern.

(b) State a named technique used to restore the normal heart rhythm.

(c) Annotate image I to indicate one phase where the atrium is contracting and one phase where the ventricle is contracting.

(Option D continues on the following page)
(Option D, question 23 continued)

(d) State **one** unique characteristic of cardiac muscle cells. [1]

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*(Option D continues on the following page)*
24. Gas exchange between maternal blood and fetal blood occurs in the placenta. The graph shows the dissociation curve of oxygen from the mother.

(a) State which mineral ion is found in hemoglobin. [1]

(b) On the graph, draw the dissociation curve for fetal hemoglobin. [2]

(Option D continues on the following page)
25. Explain the mechanisms carried out in the blood to control the changes of pH during the transport of gases. [6]

End of Option D