



**General Certificate of Secondary Education  
June 2012**

**Human Health and Physiology                      44151F**

**(Specification 4415)**

**Unit 1: Topics in Human Health and Physiology  
(Foundation)**

***Report on the Examination***

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## General Comments

There were sixteen questions in the paper. Of these, questions one to twelve were set as 'low' demand. Questions thirteen to sixteen were common with the higher paper and were set as 'standard' demand.

Schools and colleges are also reminded of the booklet '[Notes on the Scope of the Subject Content](#)'. This booklet indicates the depth of treatment required for many of the topics in the specification. There were several instances where students' answers generally fell short of the required depth.

Students should be advised to follow the rubric on the front of the question paper and write in black ink or black ball point pen only. The scanning process involved in online marking does not pick up pale colours well. Furthermore, students should be advised to ensure that if their answers extend beyond the printed lines or space then they should keep these extensions away from the edges of the page as they may be removed during scanning.

In general, there were relatively few questions which were not attempted by students. The majority of students appear to have been entered for the correct tier as there were relatively few who may have had access to higher grades if they had been entered for the higher paper.

There were some topics which many students found challenging, for example naming an enzyme or labelling parts of the human body. Also linking structure to function in the female reproductive system and describing how the body gets rid of waste products were poorly answered.

The reading of questions carefully and thinking about the response before writing an answer would greatly help many students.

Detailed comments on individual questions are given below and these, along with the Mark Scheme, should help centres to prepare students for future examinations.

### Question 1

Most students were able to answer part (a) correctly, but the number of correct answers progressively decreased from (a) to (d). For example, less than half knew that the Endocrinology department checked hormone levels.

### Question 2

- (a) Most students were able to correctly identify the health professionals as cytologists.
- (b) In part (i), it was encouraging to note that most students could correctly label all three parts of the normal cell and almost all could label at least one part. In part (ii), students lost marks for descriptions such as 'larger cells', 'there are more of them' or 'they are joined together'. Many correct descriptions included the presence of more than one nucleus or that the cells were overlapping, with the most popular answer being the fact that the cells were deformed or abnormal in their shape.
- (c) The most common answer for two marks was 'smoking and alcohol'; there were also a lot of answers concerning increased exposure to sunlight. Incorrect answers included unqualified references to drinking, genetics and sunbeds.

### Question 3

- (a) Although the majority of students knew that protein and carbohydrate were the correct answers for (i) and (ii) respectively, there were slightly fewer who correctly identified vitamin C for (iii).
- (b) This was well answered in terms of strong teeth and bones for two marks, but there were a lot of answers concerning rickets or growth unqualified.
- (c) In part (i), approximately half the students could correctly identify high blood pressure or heart attack with some commenting about dehydration. The other half thought that high salt could lead to high cholesterol or turn into fat or clog arteries or lead to obesity. A few thought kidney failure could be a possible consequence. Part (ii), was better answered than part (i) with a good number correctly stating diabetes. Other correct answers included rotting teeth and becoming obese. Incorrect responses included heart attacks, high blood pressure or becoming hyperactive.

### Question 4

- (a) In part (i), answers were almost always faultless, with most stating 'ambulance siren'. Others correctly picked sounds that were between the painful and intolerable scale. It was rare to see an incorrect answer to part (ii).
- (b) Almost all students could give at least one way to protect workers from loud sounds, but most then went on to give a second way which was, in fact, the same marking point made twice. For example, headphones and ear muffs were the two most common answers. Very few students suggested reducing the exposure time and even less managed to describe the muffling of machinery adequately for one mark. Many felt that sound proofing the room that the employees were working in would help.

### Question 5

- (a) More than three quarters of students could correctly identify the valve for (i), but less than a third were able to correctly identify (ii) and (iii). Answers were fairly evenly split between A, E and D for (ii) and A, C and E for (iii).
- (b) Part (i) was generally not well answered with vague statements about fat deposits or the heart not being able to beat properly. Answers which gained marks were usually 'blood clot' or 'atheroma', although few could actually spell atheroma correctly. In part (ii), most students were able to give one factor, but relatively few gave two correct factors. Popular incorrect responses included too much exercise or too much salt or stress. In part (iii), just over half of all students thought that exercise would be the advice given. There were a lot of incorrect answers which focussed on dietary changes. Others thought it would be a good idea to stay in bed, take no exercise at all, to reduce stress or to do breathing exercises.

### Question 6

- (a) The majority of students impressively gained three marks here. The fourth mark was usually lost for thinking that Jenner's idea was a theory rather than a hypothesis.
- (b) Approximately half the students correctly gave the idea that he should not have tested it on a boy whereas others incorrectly thought that he should have tested it on more than one person or that it was simply unreliable.

- (c) Again this was well answered with an impressive number achieving three marks. Sometimes, the third mark was lost when stages 2 and 3 were muddled by placing animal testing before tissue culture.

### Question 7

- (a) Half of all students could correctly label at least three of the four glands.
- (b) Part (i) was very poorly answered with the majority thinking that either insulin or bile were actually enzymes. Some even thought that pancreatic juice or pancreatic duct would be worthy of a mark. A popular correct answer to part (ii) was 'it cured/helped people with diabetes'. There were many vague statements about it simply helping people or that it could help pet dogs who had diabetes. Part (iii) was answered better than part (ii) with approximately three quarters of all students obtaining a mark for realising that it was cruel to the dogs. Responses not credited focussed on the fact that dogs and humans are different or that it may not work on a human.
- (c) A good number of students were able to answer part (i) correctly, but the number of correct answers progressively decreased from (i) to (iii). For example, less than half thought that the insulin gene was inserted into the bacterial DNA, there was an even split between DNA and nucleus as an answer here.

### Question 8

- (a) The first sentence completion was invariably correct with most preferring to state 'area' rather than 'surface area', however very few went on to state 'capillaries' in the second part. 'Vessels' was a very popular answer, but was not accepted as it was too general a term to use.
- (b) It was rare to see an incorrect answer to part (i). In part (ii), the vast majority of students could correctly calculate the answer as 17. Marks were either zero or two with very few picking up a mark for the correct idea of adding up and subtracting from 100 (they tended to subtract from 360). Students should be reminded that they must have a calculator for this exam. Incorrect subtractions to give 27 were seen on occasions. In part (iii), half of the students scored two with the other half scoring zero here. Many simply gave 8 as their answer without any workings for zero marks or thought that 50 divided by 8 was the correct way of doing it.
- (c) Few could label all three parts of the digestive system correctly. However, approximately half of them achieved at least two marks.

### Question 9

- (a) Most students knew that B was the correct label for the structure that produces the eggs (i) but fewer were able to correctly label the structure where sperm is deposited (ii) or where the fetus develops (iv). Even less were able to correctly label the structure where fertilisation takes place (iii).
- (b) Very few students answered part (i) well enough to be awarded a mark, those that did notice the increase in the chances of fertilisation did not comment adequately and gave vague statements such as 'there is more chance' or 'it will definitely be fertilised'. Most students thought it would be cheaper or quicker or that it was more natural this way or gave information that was already in the stem of the question. For example: 'the sperm is injected straight into the egg'. In terms of answers to part (ii), students are advised to look more closely at the data displayed in a bar chart, often only some of the values were used (for example, less than 35 and more than 43 for IVF and ICSI, respectively, when referring to more successful treatments) or not using the

labels from the axes such as ‘percentage of successful pregnancies’ to fully describe the pattern.

### Question 10

- (a) Both parts to this question were poorly answered with less than half of all students gaining a mark in parts (i) and (ii). For part (i), many students thought it was B rather than A and for part (ii) the wrong choice of D instead of C was often seen. Some even used X or Y for their answer. Students should be reminded of the importance of reading the instructions given very carefully before making their decision.
- (b) In part (i), students were particularly good at completing the genotypes for the inheritance of PKU with high numbers achieving three marks. However, some lost a mark when they forgot to fill in the first box for the mother’s genotype or two marks were lost when they got aa and AA the wrong way round. In part (ii), surprisingly few students managed to work out that the answer would be zero. Many remembered the 25% chance they had seen before when calculating previous chances with a recessive allele.

### Question 11

- (a) In part (i), only the very best students scored three marks here with most picking up one mark for noting that the bacterial colonies were much smaller in size than the *Penicillium* colony. There were many confused descriptions concerning the ‘big blob’ producing lots of little ones or that the *Penicillium* was turning into lots of bacteria. Part (ii) was poorly answered. Students need to be aware of the significant difference between **describing** and **explaining**, many simply repeated what they had described in part (i). It was rare to be able to award two marks, one mark was usually available for mentioning the fact that the *Penicillium* was killing the bacteria. Marks were not awarded for the *Penicillium* ‘fighting’ or ‘absorbing’ the bacteria or that the bacteria were actually moving away from the *Penicillium*. A clear distinction was not made between the *Penicillium* culture and the substance that it produced, namely penicillin.
- (b) This was answered better than (a)(ii) with more students linking the observation to the idea of curing diseases. However, once again there was a lack of understanding concerning the *Penicillium* and the antibiotic which it produced. There were many that incorrectly thought it would help cure colds and flu. A lot of ideas wrongly focussed on being more hygienic and the need to wash your hands etc.

### Question 12

This question was greatly misunderstood and students described the process of digestion from the mouth to the anus, they did not even pick up a mark for the idea of faeces being produced in the large intestine as it was described as ‘poo’ or ‘excretion.’ A great deal of confusion arose here with the kidney producing urea or the urea from the liver passing directly to the bladder or the ‘wee’ leaving the vagina. There were also references to the food passing through the liver and pancreas. Vomiting, coughing and sneezing were also included as methods to rid the body of waste products. Some also described how eggs are lost during the menstrual cycle.

One mark was usually awarded for a comment concerning the skin sweating or the lungs breathing out carbon dioxide. The better students were able to score two or three marks with only the very best achieving four or five marks.

### Question 13

- (a) Students were particularly good at naming a viral disease with most choosing cold or flu. They were not so good at naming a bacterial or fungal disease. Many gave throat

or 'chest infections for a bacterial disease, which were considered too vague. Those that were correct usually stated 'food poisoning'. Others named colds or flu again or misunderstood what was being asked and stated things like 'by not washing your hands'. Many incorrect answers for the fungal disease included gangrene, cancer, mould or simply fungal infection. Those who were correct usually stated athlete's foot or thrush. Few could name a disease caused by a protoctistan; this question was often left unanswered. Malaria was the most common correct answer here.

- (b) Reading the question carefully and noting the point about '**preventing entry**' would have helped many students as descriptions of how white blood cells or phagocytes and antibodies defend against disease were common place.

Only the best students achieved two marks for this question. It was encouraging to note how well these students could describe a range of methods of prevention. Others achieved 'an allowed mark' for stating skin and mucus or skin and cilia. They missed the second mark due to the lack of qualification such as 'acts as a barrier' and 'traps pathogens' etc. Using the stem of the question was a common mistake when qualifying the use of the skin. For example, 'the skin prevents entry of pathogens'. There was also a general misunderstanding concerning the role of cilia with many stating that they trapped the pathogens. However, the idea of mucus trapping pathogens was generally correct when used. A good many students described how the nose hairs trapped germs and this was ignored.

#### Question 14

- (a) This part was well answered with most students noting that the number of step-ups and time they waited before taking the heart rates were important control variables. Marks were often lost when students simply stated 'time' or 'exercise' or thought that the mass and recovery heart rate were control variables.
- (b) A good number were able to name the graph correctly.
- (c) The majority ringed the recovery heart rate of 110. Mistakes occurred when they thought the person with the lowest mass or the highest recovery heart rate would be the fittest.
- (d) It was rare to see a correct answer to this part. Students tried their very best to find a pattern. Students seemed uncomfortable in stating that there was actually no direct relationship.
- (e) This part was well answered with many students mentioning asthma and smoking as two factors. Other popular answers included age and height. Mistakes occurred when students thought that weight was acceptable or that the number of step-ups was a valid answer.
- (f) Approximately half of all students scored at least one mark with the more able achieving three marks. One mark was usually credited for the realisation that more oxygen was needed to get to the vital organs. The better students were able to link this idea to the working muscles and the need for more energy. Many incorrectly described the long term effects of exercise and how to get fitter or stronger or decrease the chances of a heart attack. There were also a lot of descriptions which included sweating and burning up calories to lose weight. There were a number of obscure and irrelevant references to homeostasis. No marks were given for descriptions which missed important scientific points. For example, 'more blood is pumped around the body to reach the lungs and heart so they can work well and not tire easily'.

- (g) The majority of students could give at least one valid recommendation. Many stated that you should eat healthy foods or have a balanced diet which was ignored for the second mark. The idea of losing weight was often considered, but was not qualified with the mention of eating less food.

### Question 15

- (a) Most students gained at least one mark for correctly labelling Z as a red blood cell. There were disappointingly few who could correctly label the capillary or plasma.
- (b) This question was not well answered and most students failed to understand what was being asked of them. Values from the table were repeated with comments about more carbon dioxide is breathed out but more oxygen is breathed in. To gain marks here they should have also mentioned where the gases were going to and coming from. A common misconception included the lungs converting oxygen to carbon dioxide which you then breathed out. There were also a lot of answers which described how air enters the lungs with very good descriptions about the diaphragm, thorax and resultant change in volume, but sadly they were not relevant here.
- (c) Most students were able to give one difference between the healthy tissue and the tissue belonging to an emphysema sufferer. Many lost the second mark for simply stating the converse. For example, larger alveoli versus smaller alveoli. There were a number who used non-scientific descriptive terms such as the 'black bits are thicker'. Also, descriptions such as more spread out, more compact shape, fits like a jigsaw or not so jagged edges were not worthy of a mark.
- (d) A good number of students achieved at least one mark in part (i). However, many lost marks for just stating residual volume and expiratory reserve volume with no mention as to whether they increased or decreased. Others used figures read from the chart which were wrong. Students need to check the scales of charts and graphs carefully before using figures from them. In part (ii), relatively few students were able to answer in terms of oxygen concentration and two marks were relatively rare. Those awarded one mark included a mention of the amount of air breathed in being less or that there was still a lot of air left in the lungs. Incorrect statements concerning the surface area of the emphysema sufferer being larger were common. Students did not understand the difference between surface area and size and thought that because the alveoli were bigger then they must also have a larger surface area.

### Question 16

- (a) Most students ignored the guidance in the question '**apart from the cost of treating back pain**' and gave answers about the cost of the equipment needed such as drugs, X-rays and wheelchairs being very expensive. Others thought that the fact that so many people suffer from back pain would be a valid comment. Good answers included the time taken off from work and the cost due to people claiming benefit.
- (b) Very few students could correctly describe how the chiropractor treats back pain with most mentioning massage, acupuncture, surgery or painkillers. There were some who mentioned 'cracking' of bones, which was allowed, but some mistakenly called this 'clicking'. There were more than three times as many students who could correctly describe how the physiotherapist treats back pain.
- (c) Approximately half the students gained at least one mark in part (i), but few managed three marks. There was general confusion between spinal column and spinal cord. Many were unable to spell vertebra and some used the term vertebrate instead. In



part (ii), many wrongly thought that bones rubbing together or slipped discs were causing the pain. The damaged disc trapping the nerve was not often noted, probably due to lack of knowledge concerning the anatomy of the spinal column. Students seemed unaware that Y was, in fact, a nerve.

### **Mark Ranges and Award of Grades**

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