AS LEVEL

Exemplar Candidate Work

PHYSICAL EDUCATION

H155
For first teaching in 2016

H155/01 Psychological factors affecting performance
Summer 2017 examination series
Version 1
## Contents

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Introduction

These exemplar answers have been chosen from the summer 2017 examination series.

OCR is open to a wide variety of approaches and all answers are considered on their merits. These exemplars, therefore, should not be seen as the only way to answer questions but do illustrate how the mark scheme has been applied.

Please always refer to the specification (http://www.ocr.org.uk/qualifications/as-a-level-gce-physical-education-h155-h555-from-2016/) for full details of the assessment for this qualification. These exemplar answers should also be read in conjunction with the sample assessment materials and the June 2017 Examiners’ Report to Centres available on the OCR website http://www.ocr.org.uk/qualifications/.

The question paper, mark scheme and any resource booklet(s) will be available on the OCR website from summer 2018. Until then, they are available on OCR Interchange (school exams officers will have a login for this).

It is important to note that approaches to question setting and marking will remain consistent. At the same time OCR reviews all its qualifications annually and may make small adjustments to improve the performance of its assessments. We will let you know of any substantive changes.
Question 1(a)(ii)

(ii) Fig. 1.2 shows a discus thrower in action.

Fig. 1.2

Identify the predominant muscle fibre type used by the discus thrower to achieve maximum distance.

Level/Mark – 1/1

 Examiner commentary

Fast twitch on its own was too vague, candidates needed to reference 2b or mention Fast Glycolytic to gain the mark.
Question 1(a)(iii)

(iii) Explain how the function of this fibre type suits the performance of a discus throw.

Level/Mark – 2/2

Examiner commentary
Candidate accesses marks for fast contractile speed combined with as much power as possible to perform the furthest distance they can. This particular answer was an example of a single sentence with both points in the mark scheme embedded.

Level/Mark – 2/2

Examiner commentary
Point 1 on the mark scheme for works anaerobically point 2 achieved with reference to the performer throwing further.
Examiner commentary

Point 1 on the mark scheme fast speed of contraction and high power achieved with reference to the performer throwing further.

Level/Mark – 2/2

Examiner commentary

High speed of contraction has no further link so the mark is not given.

Level/Mark – 0/2
Question 1(b)(i)

(b) (i) Describe the nervous stimulation of a motor unit.

Level/Mark – 1/2

A nervous impulse reaching the synaptic cleft is incorrect. The mark is gained from 'action potential' being created. See point 1 on the mark scheme.

Examiner commentary

Level/Mark – 2/2

Point 1 given for nerve impulses conducted along the axon. Point 3 given for the mention of acetylcholine.

Examiner commentary
Examiner commentary

Point 3 given for the mention of acetylcholine. Point 6 given for ‘all or none law’.

Level/Mark – 1/2

Examiner commentary

Point 1 given for ‘nerve impulses initiated’. Point 3 given for the mention of acetylcholine.

Level/Mark – 2/2

Examiner commentary

Point 3 given for the mention of acetylcholine. Point 6 given for ‘all or none law’.
(b) (ii) Describe the frontal and sagittal planes of movement and give a sporting example for each.

Frontal
Sagittal

Level/Mark – 4/4

Examiner commentary
The candidate successfully described both the frontal and sagittal planes even though there was a little ambiguity in the movement allowed for the sagittal plane. The example of an arabesque and javelin thrower was sufficient to gain full marks.
Examiner commentary

A very efficient and accurate answer. An example of a candidate doing exactly what the question asks with minimum time wasted.

Level/Mark – 4/4

Examiner commentary

Good answer.
Examiner commentary

Again a very efficient and accurate answer. An example of a candidate doing exactly what the question asks with minimum time wasted.
(c) Explain the cardiac cycle of the heart using the following key terms:

- Atrial systole
- Ventricular systole
- Diastole.

Examiner commentary

No mark given for diastole (point 3 on the mark scheme) as the candidate failed to mention the relaxation of the heart muscle. Atrial systole included the term contraction + the flow of blood into the ventricle. The mark was given for point 1.

The candidate then fails to mention 'contraction' for the ventricular systole and thus point 2 was too vague.
Examiner commentary

Point 3 on the mark scheme achieved for diastolic phase including the terms 'relaxation' and atria fill with blood. Atrial systole was not given as the candidate fails to mention contraction of the atria.

However, they manage to gain marks for ventricular systole as contraction referred to + the flow of blood.
Level/Mark – 3/3

Examiner commentary

Point 3 on the mark scheme achieved for diastolic phase including the terms ‘relaxation’ and atria fill with blood. However, they manage to gain marks for ventricular systole as contraction referred to + the flow of blood.

Contraction linked to the systolic phases + the movement of blood around the cardiac cycle so the candidate achieves full marks. High speed of contraction has no further link so the mark is not given.
Examiner commentary

The candidate has focussed the answer on the conduction system of the heart which has distracted them from the main requirements of the question. Thus they miss the contraction of the heart muscle for both of the systolic phases and then miss marks. They do manage to access point 3 for the diastolic phase.
Question 1(d)(i)

(d) An athlete has a tidal volume of 0.5 litres and a breathing frequency of 12 breaths per minute.

(i) Calculate the athlete's minute ventilation using these values. Show your workings.

Level/Mark – 2/2

Examiner commentary

Correct calculation + resulting minute ventilation with correct units – full marks.
(ii) During a 5000 metre race, the athlete’s tidal volume increases. Explain how neural control of breathing causes this to happen.

Level/Mark – 0/2

Examiner commentary

There is no reference to neural mechanisms; receptors, RCC or respiratory muscles and therefore the answer is too vague.

Level/Mark – 0/2

Examiner commentary

Though the candidate did a good job of identifying the roles of the receptors there is no link to the next stage in the process. This new style of question with 2 marks for the explanation of a complicated process is one to look out for. Students will need to realise that to gain marks they must LINK processes.
Examiner commentary

The candidate has linked the inspiratory centre to the signals being received from the chemoreceptors to gain point 1. The remainder of the answer is too vague.
Question 2(a)

(a) Describe intermittent hypoxic training (IHT). Outline one benefit and one risk of intermittent hypoxic training.

Level/Mark – 2/4

Examiner commentary

The candidate successfully identifies that IHT includes intervals. Point 1 on the mark scheme. The acclimatizing doesn’t appear under point 5 for benefit so it is Too Vague. Under hypoxic conditions is too close to the initial question to gain marks. The risk of IHT is successfully outlined.
Examiner commentary

Point 2 on the mark scheme given for gas mask used. Point 5 given for benefit, increase the oxygen carrying capacity of the red blood cells. The point for increasing aerobic capacity would have gained a mark as a BOD had they not already mentioned the red blood cells. Dehydration is not seen as a risk so they did not access point 6.
Examiner commentary

Level/Mark – 3/4

IHT is used for athletes, mainly endurance, who... perform their activity... with a gas mask on,... to reduce the amount of oxygen available... so that it is more difficult. It is very similar to altitude training. It is good for increasing oxygen carrying capacity... it allows the performance to have an increased intensity... duration of performance. However... adaptations don’t last for a long time. 

Examiner commentary

Point 2 on the mark scheme given for gas mask used. Point 5 given for benefit, ‘increase the oxygen carrying capacity of the red blood cells’. Point 6 given for adaptations don’t last a long time.

Level/Mark – 1/4

...IHT is where an athlete lives at sea level... but trains under... hypoxic conditions, i.e. low oxygen... as if they were... at altitude. One advantage of this method is that... it can increase capillarisation... to increase the efficiency... of gaseous exchange... meaning an athlete can train for longer without buildup of lactic acid or... However, there is a risk associated with IHT is that it can cause... dizziness due to a lack of O2.

Examiner commentary

The description does not do enough to access the marks and there is a repeat of the ‘hypoxic’ conditions in the question. Benefits gain mark for increase capillarisation for point 5 on the mark scheme.
Question 2(b)(i)

(b) An elite marathon runner will have a very high VO\textsubscript{2} max.

(i) Describe how age and gender can affect VO\textsubscript{2} max.

Level/Mark – 2/2

Examiner commentary

This was generally a well answered question by candidates across the cohort. Reduced elasticity of tissues for age and larger muscle size for males accessed both points.
Question 2(b)(ii)

(ii) Evaluate the importance of a high VO$_2$ max for an elite footballer.

Level/Mark – 2/3

Examiner commentary
Candidate accesses marks maintaining/increasing intensity as well as the increase in time before fatigue. Points 1 and 2 on the mark scheme.

Level/Mark – 3/3

Examiner commentary
This is a good answer. High intensity longer… without fatigue accessed points 2 and 3 on the marks scheme. The reference to the latter part of the game was enough for a benefit of the doubt mark because the candidate is referring to the extended length of a football game for point 1.
Examiner commentary

The candidate gains a mark for highlighting the length of time the footballer has to perform for but there is then repetition. The high standard doesn’t relate to VO2 so is too vague.
Examined commentary

The candidate doesn't really emphasise the length of time the player needs to maintain their performance to gain point 1. They do manage to hit points 2 and 3 about reference to fatigue and intensity.
Question 2(c)(i)

(c) A gymnast is encouraged to follow a healthy, balanced diet by his coach.

(i) Explain how carbohydrates, vitamins and fibre in the gymnast’s diet support training and performance.

Level/Mark – 3/3

Examiner commentary

This is a good example of a successful attempt to answer. There was a requirement to link the intake or the different dietary categories to the performance of the gymnast. Examiners were looking for reference to higher intensity / reduced fatigue during training for carbohydrates, health / illness prevention for vitamins and some reference to the improved transit of food / absorption of nutrients for fibre. Thus this candidate accessed all marks.
Examiner commentary

The candidate made decent attempts to link the dietary intake to training and performance of the gymnast. Fibre once again was difficult to apply directly to training so reference to improved digestion or absorption of nutrients gained marks for point 3.

Level/Mark – 1/3

Examiner commentary

The candidate hit mark for linking carbohydrate to the training of the gymnast but vitamins and fibre were too vague.
Examiner commentary

Candidate made decent attempts to link the dietary intake to training and performance of the gymnast. Fibre once again was difficult to apply directly to training so reference to improved digestion or absorption of nutrients gained marks for point 3.
(ii) Assess the possible long term effects on the gymnast if he regularly follows a diet that is high in fat and low in proteins.

Level/Mark – 1/2

Examiner commentary

This candidate only really attempted to consider the effect of high fat in the diet and thus the gain in weight was awarded for point 1 on the mark scheme. The second part of the answer related to fat and thus was a repetition.
Examiner commentary

Point 1 given for diet high in fat increasing body mass and making the person overweight point 2 for lack of protein meaning longer for growth and tissue repair.
Question 2(d)

(d) The three phases of training are named below. Outline what is meant by each phase, and, using sporting examples, describe a specific objective for each phase.

Preparatory

Competitive

Transition

Level/Mark – 4/6

Examiner commentary

The phases of training required candidates to outline the phase and give an example of the objective of each phase from sport. Any mention of ‘pre-season’ for preparatory, during the season, for competitive and post season for transition enabled candidates to access the first part of the question. Both fitness and skill related examples were accepted for objectives.

This candidate was given marks for ‘pre-season’ + long distance high intensity for the swimmer for the preparatory phase. The competitive phase meaning was given but the example was too vague. While the meaning for transition was given the example of rehab for injury was again too vague.
Preparatory...This consists of the off season and the pre-season of a sport. The main objective is to maintain fitness and skill levels. This is the phase where the athlete is preparing for competition.

Competitive...Consists of competitive phase 1 and competitive phase 2. This is where the competition takes place and players, for example, the league begin pictures begins in football. The specific objective of this stage phase is to work on strategies and tactics.

Transition...This is after the competitive phase and is where the performer is more likely to be recovering from the competitive season. The main objective is to aid recovery and prepare for the next season (light exercise to maintain fitness and skill levels).
Examiner commentary

Point 1 given for ‘pre-season’ however the example was limited and Point 2 for successful example. Point 3 given for tapering training and successful example. All the transition phase was too vague.
Examiner commentary

Preparatory phase and example given for points 1 and 2 building base level of fitness / cardiovascular endurance. Competitive mark given for 'time in season'. The skill example was given for point 4.
Question 3(c)(i)

(c) A sprinter generates momentum. They have a mass of 70 kg and run at a velocity of 10 m/s.

(i) Define and calculate the sprinter’s momentum, showing your workings.

Level/Mark – 0/3

Examiner commentary
Definition was too vague for point 1 on the mark scheme. Calculation and equation incorrect and thus resulting momentum is incorrect.

Level/Mark – 2/3

Examiner commentary
The definition of momentum is too vague but both the calculations and the resulting momentum in the correct units gained marks.
Examiner commentary
The definition of momentum is good. The calculation is given but the units are incorrect for the result.

Level/Mark – 2/3

Examiner commentary
The definition of momentum is too vague but both the calculation and the resulting momentum in the correct units gained marks.
Question 3(c)(ii)

(ii) At what velocity must a 100 kg athlete run to have the same momentum as calculated above?

Level/Mark – 0/1

Examiner commentary

Incorrect calculation.
Question 3(d)

(d) Describe how the force of weight acts on a sporting body. Using examples from sport explain **three** factors affecting air resistance.

Level/MARK – 3/5

Examiner commentary

Mark given for 'gravitational pull' for point 3 on the mark scheme for describing the force. Point 7 given for higher velocity = higher resistance. Point 4 given for cross-sectional area.
Examiner commentary

1 mark for the description of weight acting on the body – gravitational pull point 3. Nothing else offered for description. Smoothness of surface, frontal cross sectional area and shape all gained marks with good example points 4, 5 and 6.

Weight is the gravitational pull the Earth exerts on a body.

Factors:

1. Smoothness of surface: for example lycra suits are used as the surface is smoother so air resistance is reduced.

2. Frontal cross sectional area: for example, alpinists crouch when going down a slope to reduce their frontal cross sectional area which reduces air resistance.

3. Shape: The more aerodynamic an object is, the less air resistance acts on the object for example tear drop helmets are worn by road cyclists.
Level/Mark – 5/5

Examiner commentary

Two marks for the description for weight acting down on the body Point 1 – gravitational pull point 3. Smoothness of surface, frontal cross sectional area and velocity all gained marks with good examples for points 4, 7 and 6.
Level/Mark – 4/5

Examiner commentary

Two marks for the description for weight acting on the body – from the centre of mass point 2 / downwards point 1. Size of the object is not sufficient for point 4. But the candidate hits point 5 for aerodynamics and point 6 for smoother surface.
Question 3(e)(i)

(e) (i) Sketch a second class lever system in the box below, and identify the effort arm and load arm.

Level/Mark – 1/3

Examiner commentary

No clear indication of the length of the load arm and effort arm so despite the correct wording no marks given for points 2 and 3 on the mark scheme. The order of the lever system gained point 1 on the mark scheme.
Question 3(e)(ii)

(ii) Describe a sporting example of a second class lever system in the human body.

Level/Mark – 0/1

Examiner commentary
This answer needed reference to the ankle joint, or a specific fulcrum to enable the candidate to gain the marks.

Level/Mark – 0/1

Examiner commentary
Incorrect example.

Level/Mark – 1/1

Examiner commentary
Plantarflexion to lift up the body. Although the reference is to the heel, the plantarflexion explains the movement in the ankle so the mark is given.
Question 3(e)(iii)

(iii) Explain why a second class lever has a mechanical advantage.

Level/Mark – 1/2

Examiner commentary

Point 2 given for second class levers require smaller effort to lift larger load. The second part of the sentence was Too Vague because there was no comparison between the effort arm and load arm.

Level/Mark – 2/2

Examiner commentary

Points 1 and 2 accessed.
The load arm is smaller than the effort arm, so therefore you are able to lift more weight with less effort, or the load is closer to the fulcrum.

Examiner commentary
Points 1 and 2 accessed.

The effort arm is longer than the load arm, and so it has a larger force meaning it can lift heavier objects with less effort.

Examiner commentary
Points 1 and 2 accessed.
Jogging is a very popular aerobic sporting activity as part of a healthy lifestyle.

Explain the immediate effects of jogging on the vascular system, and evaluate the impact of regular training on lifestyle diseases of the cardiovascular system.

Level/Mark – 5/10
Examiner commentary

This answer was weighted heavily in terms of the impact of regular jogging on lifestyle diseases and much less in terms of the immediate effects of jogging on the vascular system. There was no real indication that the candidate knew about the vascular shunt mechanism and little knowledge of the importance of venous return on the CV system during exercise.

The candidate did however manage to access points from the indicative content relating to CHD, arteriosclerosis and hypertension. Awarded on balance 5/10; middle of level 2.
The immediate effects of jogging on the vascular system allow the performer to carry on exercising properly. The vascular system is under the control of the vasomotor control centre in the medulla oblongata. Regular exercise causes the arterioles relax leading to the muscles to vasodilate and the pre-capillary sphincters to open. This increases blood flow to the muscle, allowing the performer to use exercise at a higher intensity for longer without getting tired or glycogen. At the same time, the arterioles leading to the unessential organs vasoconstrict and the pre-capillary sphincters close. This reduces blood flow and therefore oxygen transport to these areas.

Long term lifestyle diseases can arise due to a lack of exercise, but also regular exercise can reduce the affect of these diseases or even get rid of them. The main cardiovascular diseases are atherosclerosis, the coronary heart disease, heart attack and stroke. Each of these have different effects on the body and are caused by different things.

In conclusion, the vascular shunt mechanism that is controlled by the vasomotor control centre controls blood flow around the body, which is especially important during exercise to prevent blood shunting.
Examiner commentary

The candidate did a very good job of explaining how the vascular shunt mechanism works as an immediate effect of jogging. Balanced the impact of regular training with good detail about the reduction of CHD and its associated components. Had the candidate mentioned Venous Return in the first part it would have warranted full marks.
Jogging increases the HE of the performer. This is caused by the sympathetic nervous system as well as the release of adrenaline. The increase in HE also means an increase in the CO cardiac output. Jogging is very good as it allows you to lose weight and uncovet fat. It can be very good as it causes muscle hypertrophy of the cardiac muscle which allows more blood to be pumped out of the heart (Vasorum...)

It also causes the VCL to expand in the arteries. Medial Oblongate to cause a response within the vascular system with an increase in exercise, the heart muscle...in demand of more O2. So...

It activates and stimulates vasodilate factors so the muscle allows more blood to flow to the muscles, increasing O2 levels so increasing aerobic respiration.

The pre-capillary sphincter also dilates. In addition, the arterioles are constricted to allow O2 to the body, reducing blood flow. This will all lead to a much healthier lifestyle with less chance of CHD...and regular aerobic exercise. The resting heart rate is lower.

Oxygen will be present in the blood, which will mean a good supply of oxygen for the heart so it can perform properly.

* There is also hypertrophy of the left heart muscle...
Examiner commentary
The candidate did a very good job of explaining how the vascular shunt mechanism works as an immediate effect of jogging. There is particular emphasis on the roles of pre-capillary sphincters and specific areas of vasodilation and vasoconstriction. They also manage to consider CHD. There is a good mix of AO1, AO2 and AO3 in the answer.
Jogging causes an effect on the vascular system, which allows blood to be redistributed around the body in order to supply working muscles with more blood and therefore oxygen. Chemoreceptors detect changes in the levels of oxygen and carbon dioxide/lactic acid in the blood due to exercise beginning. Baroreceptors detect pressure changes, e.g., in the veins/arteries, which signal that exercise has begun. The vasomotor centre receives these signals from the receptors, which stimulates arterioles and precapillary sphincters to vasoconstrict at organs such as in the digestive system which are not needed during exercise, and vasodilate at working muscles to allow more blood flow to supply more oxygen and to get rid of waste products, e.g., lactic acid quicker.

Regular training can reduce the chance of suffering a form of cardiovascular disease (CVD), such as atherosclerosis, heart attack or stroke, by around 30%. Regular training means that arteries and precapillary sphincters are more regularly changing between a state of vasoconstriction and vasodilation. This means there is less likely to be a hardening layer around the inside of the blood vessels, as they are being worked regularly. Regular training can also increase the proportion of HDL to LDL, meaning that there will be less build-up in the arteries of fatty substances, reducing the chance of a blockage which may cause a heart attack, stroke or angina. Regular exercise will also lead to cardiac hypertrophy - the strengthening of cardiac muscles. This will reduce the chance of CVDs such as heart failure, as the heart will be stronger and healthier and so be better suited to coping with the everyday demands placed upon it as well as the strains of exercise.
Examiner commentary

The candidate did a very good job of explaining how the vascular shunt mechanism works as an immediate effect of jogging. Balanced the impact of regular training with good detail about the reduction of CHD and its associated components.

There wasn’t enough A02 or A03 along with evaluation of the negative impacts of regular training to move the candidate into Level 3. As the discriminators suggest for Level 3 the candidate requires ‘detailed and accurate understanding of both immediate effects and a range of lifestyle diseases described.’
Jogging is a submaximal exercise. Heart rate increases from around 72 BPM to 150 BPM, which is 80% of their HR max.

Venous return increases so more oxygen can be delivered to the working muscles, which also increases stroke volume. The respiratory and skeletal muscular pump increases venous return, aiding the delivery of oxygen. In addition, sympathetic stimulation, informed by the autonomic nervous system, mechanisms occur to raise the blood pressure, and so the arterioles and pre-capillary sphincters constrict to allow more oxygen to be delivered, and carbon dioxide to be removed. Sympathetic stimulation increases so arterioles and pre-capillary sphincters constrict, vasodilate to allow more oxygen to be delivered and carbon dioxide to be removed. Sympathetic stimulation increases so arterioles and pre-capillary sphincters constrict, vasodilate to allow more oxygen to be delivered and carbon dioxide to be removed.

Regular training will reduce the chances of cardiovascular disease, always definitely. The blood viscosity will reduce, so there is less chance of a blood clot occurring. Also, there are less likely to be fatty deposits in the body. Moreover, atherosclerosis will be reduced because the regular exercise will be maximised blood flow, so reducing...
Examiner commentary

The candidate considers the effects of venous return on the stroke volume during exercise as well as identifying skeletal muscle pump and the respiratory pump. Though there is a lack of clarity in the explanation of the vascular shunt mechanism the candidate manages to get the point across successfully.

The candidate then goes on to mention reduction of the chances of suffering from cardiovascular diseases. The answer is heavily based around AO1 indicative content and less if any about AO2. AO3 is done reasonably well and enough to put the candidate into the middle of Level 2.
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