GCE MARKING SCHEME

APPLIED SCIENCE
AS/Advanced

JANUARY 2014

INTRODUCTION

The marking schemes which follow were those used by WJEC for the January 2014 examination in GCE APPLIED SCIENCE. They were finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conferences were held shortly after the papers were taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conferences was to ensure that the marking schemes were interpreted and applied in the same way by all examiners.

It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conferences, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about these marking schemes.

GCE APPLIED SCIENCE

January 2014 Mark Scheme

Section A

Question	Answer	Marks
1.	Any **three** (2 marks); any **two** (1 mark) from: • Hair loss • Poor eyesight • Mouth cancer • Increased coughing & sneezing • Lung cancer • Stomach cancer • Skin cancer • Gangrene • Stroke • Wrinkles • Throat cancer • Heart disease/ heart attack • Kidney cancer • Fertility problems • Poor circulation • Emphysema Not: yellowing of skin/teeth bad breath	2
2.	**For:** • Contributed to the Health Service • Any health related benefit/reduces passive smoking • Reduces cost of treatment of smoking related diseases • Increased attendance **Against:** • Self-inflicted condition • Expensive to run non-smoking groups • Reduces resources available to health service	1 1
3.	Reference to high affinity of carbon monoxide for haemoglobin/ Carbon monoxide carried in rbc/haemoglobin instead of oxygen Less oxygen to (respiring issues/muscles/ organs)	2
4.	Any **two** of: • Less oxygen to foetus • Lower birth weight/impaired development/ • Risk of premature birth	2

Question	Answer	Marks
5.	Any **three** from: • (More) people giving up/not starting/less people smoking/more help for people to give up • People not prepared to inhale secondary/other peoples/passive smoke /secondary/passive smoking is bad for health • Smoking bans in public places/restaurants etc. • People now more aware of the risks/damage of smoking/diseases/ health risks are now known/causes cancer/heart disease/smoking is bad for the health/reduces life expectancy • More parents/adults not smoking at home/not prepared for their children to inhale passive/secondary smoke/ smokers not seen as good role models • Cost of tobacco products is now prohibitively expensive for many. • Cigarette packets now carry health warnings/smoking kills. • No advertisements/adverts referring to dangers of smoking/withdrawal of sponsorship/covering displays in supermarkets • The age limit has been raised to 18 for purchasing cigarettes. • (Due to the effect on unborn child) pregnant women give up smoking. • Stigma associated with smoking • Reference to vapour cigarettes	3
6.	**One** of: • Benzopyrene • Dimethylnitrosamine	1
7.	Any **two** from: • Second hand smoke is made up mainly of sidestream smoke (which is about four times more toxic than mainstream smoke.) • Sidestream smoke contains much higher levels of many of the poisons/ cancer-causing chemicals in cigarettes	2
8.	Any **two** from: • Increases the heart (beat) rate • Increases blood pressure • Heart needs more oxygen.	2
9.	Physical/psychological adaptation to long-term drug use (owtte)	1

Question		Answer	Marks
10.	(a)	Any **two** of: • Alveolar walls break down/fewer alveoli /air sacs • Larger air spaces • Less surface area	2
	(b)	Less oxygen (diffuses) into blood Less carbon dioxide (diffuses) out	2
	(c)	Decreases/lower	1
11.	(a)	Non-invasive/good soft tissue resolution/clarity/detailed/3D image	1
	(b)	Any one hazard with corresponding precaution. Hazard: (strong) magnetic field/(wearing) metal objects/ joint replacement Precaution remove metal objects/ jewellery/ complete a pre-questionnaire/ask patient about metal objects/use alternative scanner Hazard: noise Precaution: wear headphones/ear protection/calm down/advanced notice Hazard: confined space/claustrophobic Precaution: calm patient/give sedative/use alternative scanner	2
12.	(a)	Any **two** from: • Both rise (between 1920 and 1960) • Men started smoking before 1900/ women's smoking started increasing after 1920 - 1925 • Similar levels of smoking (in men and women) by 1990 • Smoking in men**,** now levelled off/ plateaued/smoking in women continues to rise	2
	(b)	Any **two** from: • Similar pattern between smoking and lung cancer • The increase in incidence of lung cancer lags behind increase in smoking • Once smoking has levelled off there is a corresponding levelling off in incidence of lung cancer • Men always smoking more than women and men having higher rates of cancer	2
		Total	**29**

Section B

Question			Answer	Marks
13.	(a)		A – SAN B – AVN	2
	(b)		Any **three** plus correct sequence • Excitation starts at SAN • Spreads across atria • Atria contract • Excitations spreads to AVN • Down Bundles of His • Through Pyrkyne tissue • Ventricles contract (from apex)	4
	(c)		P – excitation of the atrial walls/atrial systole/contraction of atria QRS – excitation of the ventricle walls/ ventricular systole/ contraction T – recovery of the ventricle walls/ diastole	3
	(d)	(i) (ii) (iii)	Tachycardia – QRS should be closer together Ventricular fibrillation – no real pattern Bradychardia – QRS should be further apart	3
14.	(a)		Coronary arteries	1
	(b)		Any **three** from: • Increases size of lumen/reduces blockage/opens artery • Increases blood flow/decreases resistance to blood flow/blood flows more quickly • More oxygen available • For heart muscle/cardiac muscle/ myocardium • More carbon dioxide removed	3
	(c)		Blockage at **A** would results in a greater proportion of the heart muscle being deprived of blood/oxygen	1
	(d)		Any **four** from: • The cuff is inflated/pumped up (around upper arm) • to a pressure of approx 180 mmHg • to prevent blood flow • Cuff is deflated until blood flow begins • this gives systolic pressure • Cuff loosened further until free blood flow • this gives diastolic	4

<table>
<tr><th colspan="2">Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>15.</td><td>(a) (i)
(ii)</td><td>O-
AB+</td><td>1
1</td></tr>
<tr><td></td><td>(b)</td><td><table><tr><th>Component</th><th>Function</th></tr><tr><td>erythrocytes</td><td>transport of oxygen</td></tr><tr><td>leukocyte</td><td>produces antibodies</td></tr><tr><td>thromocytes</td><td>clotting</td></tr><tr><td>plasma</td><td>transport of glucose</td></tr></table></td><td>4</td></tr>
<tr><td></td><td>(c)</td><td>No
Since the white blood cell count too high</td><td>2</td></tr>
<tr><td>16.</td><td>(a)</td><td>Axes (1)
Plot (2)
Scale (1)
Max of 2 for line graph</td><td>4</td></tr>
<tr><td></td><td>(b)</td><td>(128+80)/2 = 104 mmHg</td><td>1</td></tr>
<tr><td></td><td>(c)</td><td>Increase efficiency of (diffusion) of oxygen/ carbon dioxide
(not: ref. uptake/pick up/gas exchange)</td><td>1</td></tr>
<tr><td></td><td>(d)</td><td>Arteries need blood to be at high pressure for delivery of oxygen to all organs, veins bring deoxygenated blood back to heart</td><td>1</td></tr>
<tr><td></td><td>(e)</td><td>Any three from:
• Valves prevent backflow
• (Action of surrounding) muscle pushes blood/squeezes veins
• Large lumen
• Little resistance
• Reference to gravity effect (from areas above the heart)</td><td>3</td></tr>
<tr><td></td><td>(f)</td><td>Any two from:
• One cell thick;
• Simple epithelium/squamous epithelium;
• Pores;
• Selectively/partially permeable
• Large cross-sectional area</td><td>2</td></tr>
</table>

<table>
<tr><th colspan="2">Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>17.</td><td>(a)</td><td>One mark per row

<table><tr><td>Intercostal muscles</td><td>Contract</td><td>Relax</td></tr><tr><td>Ribs</td><td>Up and out</td><td>Down and in</td></tr><tr><td>Diaphragm</td><td>moves down/flattens</td><td>moves up/dome shaped</td></tr><tr><td>Volume</td><td>increases</td><td>decreases</td></tr><tr><td>Pressure</td><td>decreases</td><td>increases</td></tr><tr><td></td><td></td><td></td></tr></table></td><td>4</td></tr>
<tr><td></td><td>(b) (i)</td><td>(400 x 4) x 3 =4 800 cm^3</td><td>1</td></tr>
<tr><td></td><td>(ii)</td><td>(1000 x 10) x 3 = 30 000 cm^3</td><td>1</td></tr>
<tr><td></td><td>(c)</td><td>X – normal breathing/rest
Y - Exercise</td><td>2</td></tr>
<tr><td></td><td>(d)</td><td>Any one from:
• Air in alveoli stationary
• Not all passes out at each expiration/ref dead space
• Inspired air has to exchange gases with alveolar air</td><td>1</td></tr>
<tr><td></td><td>(e)</td><td>(To prevent) volume changes/expansion due to temperature</td><td>1</td></tr>
<tr><td colspan="3">Total</td><td>51</td></tr>
</table>

WJEC
245 Western Avenue
Cardiff CF5 2YX
Tel No 029 2026 5000
Fax 029 2057 5994
E-mail: exams@wjec.co.uk
website: www.wjec.co.uk