GCE

Human Biology

Advanced Subsidiary GCE

Unit **F222**: Growth, Development and Disease

Mark Scheme for June 2013

Annotations

Annotation	Meaning
✔	correct response
✖	incorrect response
	benefit of the doubt
	benefit of the doubt **not** given
	error carried forward
	information omitted
	ignore
	reject

Question			Answer	Marks	Guidance
1	**(a)**	**(i)**	box drawn around **,** A and T/T and A/G and C/C and G **;**	1	The outline must only include the bases. **DO NOT CREDIT** if sugar(s) and/or phosphate(s) are included **ACCEPT** if more than one pair is **correctly** identified
		(ii)	*idea that* makes sure, DNA / it, replicated, accurately / correctly **;** reduces chances of mutation / AW **;** AVP **;**	2	**ACCEPT** no mistakes during DNA replication base sequence must stay the same (DNA) replicates to make identical copies **IGNORE** refs to cancer e.g. *idea that* mRNA transcribed correctly correct polypeptide chain / protein (for correct function)
	(b)		*idea that* codes for, growth factors / cyclins / cell cycle control protein **;** can be **,** mutated / changed **,** into **,** a cancer causing gene / oncogene / AW **;** *idea that* switched on by, growth factors **;**	1	 **IGNORE** reference to transcription factors as this is too general **IGNORE** 'it switches on other genes' unqualified

Question			Answer	Marks	Guidance
(c)	(i)		*similarities* incidence in both males and females increases, with age **OR** same incidence at 60 - 62 (*cross over point*) **OR** no incidence before 20 for both ; *differences* up to age 60-62 females have a higher incidence than males/ AW **OR** after age 60-62 males have a higher incidence / AW **OR** between 65 and70 incidence in females stays constant **OR** a correct comparison between males and female incidence for a given age ; pair of comparative figures in support (similarity or difference) ;	3	<table><tr><td>age (years)</td><td colspan="2">incidence of melanoma per 100 000</td></tr><tr><td></td><td>male</td><td>female</td></tr><tr><td>10</td><td>0</td><td>0</td></tr><tr><td>15</td><td>0</td><td>0</td></tr><tr><td>20</td><td>1</td><td>3</td></tr><tr><td>25</td><td>2</td><td>5</td></tr><tr><td>30</td><td>5</td><td>10</td></tr><tr><td>35</td><td>7</td><td>13</td></tr><tr><td>40</td><td>10</td><td>18</td></tr><tr><td>45</td><td>13</td><td>20</td></tr><tr><td>50</td><td>17</td><td>22</td></tr><tr><td>55</td><td>22</td><td>25</td></tr><tr><td>60</td><td>28</td><td>30</td></tr><tr><td>65</td><td>40</td><td>34</td></tr><tr><td>70</td><td>45</td><td>34</td></tr><tr><td>75</td><td>58</td><td>40</td></tr><tr><td>80</td><td>60</td><td>43</td></tr></table> **ACCEPT** reference to any two different ages e.g. between 20 and 60. **CREDIT** reverse argument incidence **with units** for each gender for a stated age **OR** for two different ages for the same gender with incidence units.

Question			Answer	Marks	Guidance
		(ii)	*similarity* idea that (as age increases) there has been more, exposure to UV / time in sun **ORA** **OR** idea that immune system weakens with age **OR** DNA repair mechanism impaired with ageing **OR** accumulation of mutations with age **OR** less efficient apoptosis **;** *differences* *idea that* younger females, more exposure, to UV / sun **OR** *idea that* older males , more exposure, to UV / sun **;**	2	**IGNORE** reference to smoking / carcinogens / menopause / female hormones *differences* **ACCEPT** descriptions which imply an increased exposure to sunlight e.g. older women more likely to use sun cream OR more older men are bald OR more younger women use sun beds
	(d)	**(i)**	(receptors are) protein(s) / glycoprotein(s) **;** (cell surface membrane has) complementary / specific, receptors/ binding sites **;**	2	 **IGNORE** ref to active sites **ACCEPT** a description of complementary e.g. matching shape or shapes that fit together
		(ii)	*idea that* (when) no growth factors bound / protein 1 not activated , pathway still active **;** protein 3 / 4 continuously, activated / stimulated / signalled **;**	2	

Question			Answer	Marks	Guidance
(e)	**(i)**		*idea that* drugs will only **,** bind to / inactivate / be complementary to **,** the altered (BRAF) protein **;** drug binds to specific points in amino acid sequence **;** can only target one step in this cascade **OR** will have no effect on normal cells **;**	2	**DO NOT CREDIT** reference to protein unqualified **IGNORE** reference to inhibition
	(ii)		 <u>active</u> <u>site</u> **,** changed/blocked **;** substrate will no longer bind **;** no **,** enzyme substrate complexes/products **,** formed **;**	2	**IGNORE** 'acts as an inhibitor' **ACCEPT** drug / inhibitor, binds to active site **IGNORE** growth factors (as substrate) **ACCEPT** forms an enzyme-inhibitor complex

Question			Answer	Marks	Guidance
	(f)	**(i)**	idea of a large number of, patients / AW **;** compare with, commonly used / best available treatment **;** done to establish any (common) side effects **;**	2	**DO NOT CREDIT** people unqualified **IGNORE** reference to placebo
		(ii)	*idea that* recruit patients / AW **;** people allocated to one of two groups **;** method of randomisation **;**	2	**ACCEPT** idea that you are using patients *'patients are split into one of two groups'* = 2 marks. e.g. random number generator **IGNORE** reference to placebo
			Total	21	

Question			Answer	Marks	Guidance
2	(a)	(i)	starts , slowly / gradually ; lasts for a long time ; rarely cured ;	2	**ACCEPT** slow onset **ACCEPT** long term **ACCEPT** no cure **IGNORE** ref to severity or fatal consequences or treatment
		(ii)	coronary heart disease (CHD) / angina ; atherosclerosis / arteriosclerosis ; diabetes ; (osteo)arthritis ; osteoporosis ; motor neurone (disease) ; multiple sclerosis ; Parkinson's (disease) ; Alzheimer's (disease) ; Kidney failure ; AVP ;;	2	**Mark the first answer on each prompt line.** If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = **0 mark** **DO NOT CREDIT** emphysema/asthma **DO NOT CREDIT** references to infections or genetic diseases
	(b)	(i)	*idea that* there are more young people in India (than UK) / more elderly people in UK (than in India) ; age is a variable that must be controlled ; *idea that* a valid / AW, comparison / conclusion can be made, between , countries / genders ; *idea that* (different / some) respiratory diseases are more common , in different age groups ;	2	IGNORE ref to accurate or reliable comparisons **ACCEPT** a description e.g. 'you are more likely to get respiratory diseases when you are older' or 'some respiratory diseases are more common at certain ages' 'Asthma is more common in children than in older people'

Question			Answer	Marks	Guidance
		(ii)	51 (%) ; ;	2	**Correct answer = 2 marks** even if no working shown If answer incorrect **CREDIT** 1 mark for correct working <u>942</u> x 100 1851 If answer not rounded **CREDIT** 1 mark for unrounded answer eg 50.9, 50.89, 50.891

Question			Answer	Marks	Guidance
		(iii)	*DALYs higher in India*	3	**CREDIT** reverse argument for UK
			more people smoke **;**		
			reason why air pollution is worse in India **;**		e.g. more use of coal (in home) or higher levels of traffic
			consequence of poverty qualified **;**		e.g. can't afford, treatment / health care / adequate diet
			2 max		
			There is a bigger difference between men and women in India than there is in the UK because, in India, men more exposed to pollutants at work than women **;**		**CREDIT** same argument for smoking
			There is a bigger difference between men and women in India than there is in the UK because, in India, women/female children less valued **;**		Look for an example e.g. boys likely to be fed more than girls or more likely to be treated with antibiotics
	(c)	(i)		3	**Mark the first answer on each prompt line.** If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = **0 mark**
			(smooth) muscle contracts / goes into spasm **;**		
			(bronchiole) lumen **,** constricted/narrowed/ becomes smaller **;**		**CREDIT** bronchoconstriction
			(bronchiole) wall / lining becomes **,** swollen **;**		
			lining / membrane, becomes inflamed / more folded **;**		
			more mucus produced / mucus builds up **;**		

Question			Answer	Marks	Guidance
(c)	(ii)		*for either* taken by **,** inhaler / tablet / syrup / orally **;** *steroids* may be injected **;** reduce the inflammation (in the airways) **;** work slowly / long term effect **;** *beta-agonists* bronchodilators **;** relax muscles (in airways) **;** work, quickly / immediately **;**	5	**CREDIT** once only **IGNORE** ref to widening of lumen

Question			Answer	Marks	Guidance
	(d)			2	Mark as prose
			idea of to reduce /discourage / ban, smoking ;		e.g. more education on smoking dangers / increase cigarette prices / increase age restriction on buying cigarettes / ban smoking in public places
			idea of improve air quality, qualified **;**		e.g. encouraging use of another fuel instead of solid fuel / ref to use of public transport / one car per family
			idea of reduce exposure to pollution in **,** factories/places of work **;**		e.g. offer masks in factories / limit exposure time / better health and safety regulations
			Total	**21**	

Question			Answer	Marks	Guidance
3	(a)	(i)	Klinefelter's (syndrome) ;	1	**ACCEPT** phonetic spelling
		(ii)	an extra chromosome / 47 chromosomes **OR** 2 X (chromosomes) and a Y ;	1	
	(b)		1 culture cells ; 2 (chemical added to) stimulate cells to divide / undergo mitosis; 3 stop , spindle being formed / division at beginning of metaphase ; 4 (by) adding colchicine ; 5 (before staining) (dilute) salt solution added (to burst cells) ; 6 (before sorting) chromosomes / genetic material / DNA, stained ; 7 (finally) chromosomes sorted into pairs ;	5	**IGNORE** 'stain the cell' or 'stain the sample' **IGNORE** refs to photographs
	(c)	(i)	*(non-disjunction)* lower left pair of arrows indicated **OR** middle left cell ; *(diploid)* top cell labelled ;	2	

Question			Answer	Marks	Guidance
		(ii)	the pair of (homologous) chromosomes / sister chromatids , fail to separate ; during , anaphase 1 / anaphase 2 ; one , gamete / cell , receives 2 X chromosomes ; fertilisation / AW (happens) ; results in , zygote / fertilised egg / cell / fetus , with, 47 /AW, chromosomes ;	4	
			Total	**13**	

Question			Answer	Marks	Guidance
4	**(a)**		endothelium ; lumen ; atheroma ; muscle ; oxygen ;	5	**ACCEPT** tunica intima, tunica interna **DO NOT CREDIT** epithelium **ACCEPT** plaque **IGNORE** ref. to glucose
	(b)		pain / AW, in chest ; pain spreading to, neck / arms / jaws / stomach / back ; light headed / dizzy / faint / short of breath ; vomiting / nauseous ; irregular / abnormal, pulse ; sense of doom ; (more) sweating ; skin, white or grey / lips become blue ;	2	e.g. tightness
	(c)	**(i)**	no pulse / heart not beating; unconscious ; skin, white or grey / lips become blue ;	2	**IGNORE** ref to breathing

Question			Answer	Marks	Guidance

		(ii)	*both*
			
			 1 example of initial actions carried out **;**
			
			 2 place interlocked hands / AW, on (centre of) chest
			                      and press down for 4–5cm **;**
			
			 3 repeat 30 times **;**
			
			 4 at rate of 100 compressions per minute / AW **;**
			
			 5 give rescue breaths / described **;**
			
			 6 if pulse (and breathing) return move casualty to
			                      recovery position **;**
			
			 7 uses defibrillator **;**
			
			 8 gives, aspirin / (named) anticoagulant **;**
			
			 9 administers, thrombolysing agent / AW **;** *7 max*
			
			 QWC ;
				8	e.g. check for breathing / make sure airway is clear / lay person on, his / her back / raise legs
					
					 CREDIT description e.g. 'Staying Alive'
					
					 DO NOT CREDIT 'W' position
					
					 e.g. heparin
					
					 e.g. Strep(tokinase) / clotbuster
					
					 1 mark from **mps 1 – 6 AND** 1 mark from **mps 7-9**

			Total	**17**	

Question			Answer	Marks	Guidance
5	(a)	(i)	<u>MMR</u> ;	1	
		(ii)	diphtheria ; tetanus ; whooping cough / pertussis ; polio ; influenza ;	4max	**CREDIT first four answers only.** If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = **0 mark** **ACCEPT** phonetic spelling throughout **ACCEPT** flu
	(b)	(i)	**1** (booster / pathogen produces) more / large numbers of, memory cells ; *how vaccine protects* **2** antigen injected / taken into body ; **3** primary response / described ; **4** produces (antibodies and) memory cells ; **5** specific to, antigen / pathogen ; *why more than one dose given* **6** (booster) causes a, secondary response ; **7** memory cells , activated / AW, faster ; *immune because* **8** the child is, infected with the pathogen / AW , they don't get ill / AW ; **9** (because) large(r) number of antibodies produced (when infected by pathogen) ; **10** so pathogen destroyed (faster) ; *8 max* **QWC for balanced account ;**	9	**AWARD** in context of booster or pathogen only e.g. antigen recognition, clonal selection, clonal expansion MP1 **plus**1 MP from 2 –7 **plus** 1 MP from 8 – 10

Question			Answer	Marks	Guidance
		(ii)	before 2 months child may (still) have antibodies from mother (which would neutralise vaccine) **;** disease more severe in young children / AW **;** younger children more at risk from complications of disease / AW **;**	1	**CREDIT** correct reference to (natural) passive immunity
		(iii)	risk of side effects / named side effect **;**	1	for example: high temperature, vomiting, diarrhoea, mild symptoms of disease, rash / fits /autism / illness
	(c)		insufficient protein (in diet) / AW **;** unable to make, antibodies / memory cells / lymphocytes **;** because amino acids not available **;**	2	
			Total	**18**	

Question			Answer	Marks	Guidance
6	**(a)**		cells, differentiate/become specialised / described **;** forming groups of cells called tissues **;** named tissue in respiratory system **;** (different) tissue<u>s</u> , form organs **;** named organ in respiratory system **;**	4	 ciliated / squamous epithelium, alveolar, smooth muscle, cartilage, connective tissues **DO NOT CREDIT** in the context of cells lung, trachea, bronchus, bronchiole,
	(b)		 iron **;** calcium / Vitamin K **;** calcium / Vitamin D / phosphate **;** phosphate **;** Vitamin C **;**	5	**ACCEPT** correct symbol for element or ion e.g. Ca / PO$_4^{2-}$ **ACCEPT** phosphorus for phosphate **ACCEPT** Pi
	(c)		cannot be synthesised by the body / must be present in the diet **;**	1	
			Total	10	

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