OCR
RECOGNISING ACHIEVEMENT

GCE

Applied Science

Advanced Subsidiary GCE

Unit **G622:** Monitoring the Activity of the Human Body

Mark Scheme for January 2011

Oxford Cambridge and RSA Examinations

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All Examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the Report on the Examination.

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Question			Answer	Mark	Guidance
1	a		(from) 36.5 ✓ (to) 37.2 ✓	2	**ACCEPT** range 36.0 to 37.5
	b		*any **two** from:* shivering ✓ vasoconstriction ✓ increased metabolic rate ✓ hairs raised (on skin) ✓	2	**IGNORE** unqualified muscle contraction **ACCEPT** increased involuntary muscle contraction OWTTE eg. goose bumps
	c	i	(day) 4 or 5 ✓	1	
		ii	**(before** day 4) – appropriate statement e.g. high pulse rates/variable ✓ **(after** day 4) – appropriate statement e.g. lower pulse rates/steady ✓	2	OWTTE **ACCEPT** correct descriptions without data values **Units used MUST be correct** **ACCEPT** rates/values = pulse rates
		iii	change in activity / state of mind ✓	1	OWTTE **ACCEPT scared**
		iv	highest reading = 120 **and** lowest reading = 70 ✓ difference ÷ 120 x 100 ✓ 42 (%) ✓	3	**ACCEPT** any significant figures **ACCEPT** 41.67/ 41.7 **41** $^{2}/_{3}$ **ecf** for difference and % responses – only if difference ÷ 120 x 100 **Correct answer (42%) = 3 marks**
		v	*any **three** from:* the body loses excess heat/ cools (due to vasodilation)✓ redirection of blood (from parts of body to the skin)✓ blood pressure drops ✓ (change in) blood pressure detected by receptors✓ brain/medulla, sends impulses to the heart ✓ heart beat/pulse, increases ✓	3	**OWTTE** **REJECT** messages sent **ACCEPT** signals

Question			Answer	Mark	Guidance
	d	i	**marks allocated via three different stages, as shown – any one from each stage** **preparation stage-** *any **one** from:* wipe surface of thermometer clean ✓ shake thermometer slightly downwards ✓ check, front edge of mercury column/meniscus, is below normal body temperature range ✓ **operation stage-** *any **one** from:* place (bulb-end of) thermometer, in patient's mouth (below tongue)/in fold of under arm/axilla ✓ leave thermometer (in position) for 30 seconds approximately ✓ remove thermometer carefully / hold between finger and thumb ✓ **recording stage-** *any **one** from:* hold, horizontally/at eye level ✓ turn thermometer to see calibrations ✓ take reading from front edge of mercury column ✓	3	**ACCEPT** sterilise thermometer/ use a clean thermometer **REJECT** shaking down to zero **REJECT** rectum/ ear **ACCEPT** 30 seconds to 1 minute
		ii	**advantage** – easy to use / disposable / no need to clean / does not upset the child / non/less-invasive / safe ✓ **disadvantage** – not very accurate / difficult to interpret/ read/ could fall off skin (while recording) / forehead of child not a good indicator of core temperature / slow to record ✓	2	**IGNORE** cheap/ quick **ACCEPT**affected by external environment
		iii	tympanic membrane / ear / infrared / electronic / digital / rectal / anal (thermometer) ✓	1	**ACCEPT** electric/ electrical = electronic
			Total	**20**	

Question			Answer	Mark	Guidance
2	a		skin is not cut / operation not needed ✓ no damage to, tissues/cells ✓	2	**IGNORE** no equipment entering the body
	b		**[Level 1]** Candidate shows a high level of understanding and gives a full explanation of how the X-ray scanner can be used to assess bone fracture, including **at least five** valid points expressed clearly and logically. ***(5 - 6 marks)*** **[Level 2]** Candidate shows an understanding, explaining the basic principles of how the X-ray scanner can be used to assess bone fracture, including **at least three** valid points generally expressed clearly and logically. ***(3 - 4 marks)*** **[Level 3]** Candidate shows a basic understanding of how the X-ray scanner can be used to assess bone fracture, including at least **one valid point** but with little or no explanation. ***(1 - 2 marks)***	6	*valid points include:* • X-ray/radiation passes through body /soft tissue • Radiation / X-ray produces an image / picture • X-ray film / image / picture acts as a record • image dark where most gets through / shadow image / bones white or light grey / bones give better resolution • different tissues absorb different amounts of X-rays • bones/denser material, absorbs more radiation • soft tissues absorb less radiation **IGNORE** references to generation of X rays within the valid points
	c	i	CT/CAT, scanner gives more detailed information / 3D image ✓ high resolution / greater clarity of muscles / soft tissues using CT/CAT ✓	2	OWTTE **ACCEPT** reverse answers for X rays **IGNORE** general references to 'showing soft tissue'

Question			Answer	Mark	Guidance
		ii	*any **two** from:* (use of) MRI scanner is based on magnetism / magnetic field / magnet ✓ metal (in Andrew's arm), attracted to/move towards, (magnet/machine) / damage the machine ✓ metal may damage, tissues/blood vessels ✓ distorts image ✓	**2**	**IGNORE** – can be harmful
		iii	ultrasound ✓ ECG / electrocardiogram ✓	**2**	**ACCEPT** electrocardiograph
	d		**risk** –cancer / cell/ tissue/DNA damage / **accumulation** effect over time in the workplace ✓ **safety precaution** – wear badge to register radiation / leave area of scanner when operating / wear a lead apron ✓	**2**	**IGNORE** references to the patient **IGNORE** safety glass/ unqualified screen/ unqualified protective clothing
			Total	**16**	

Question			Answer	Mark	Guidance
3	a		120 ✓ 80 (mmHg) ✓	2	numbers **MUST** be in correct position
	b		(135 mmHg is measure of) systolic (pressure) / phase of contraction ✓ (85 mmHg is measure of) diastolic (pressure) / phase of relaxation ✓	2	OWTTE
	c	i.1	lack of energy - *any **two** from:* blood carries, oxygen/glucose, around the body ✓ heart or blood vessel problem **(**will affect circulation of blood**)** ✓ less, oxygen/glucose, given to, muscles/brain/tissue/cells ✓ respiration rate drops in, cells/tissues, / less ATP released ✓	2	
		i.2	changing blood pressure - *any **two** from:* blood pressure related to, strength/stroke, of heart beat / vasodilation / vasoconstriction around the body ✓ problem with, heart beat/blood vessels, **(**will affect blood pressure**)** ✓	2	**ACCEPT** correct reference to baroreceptors

Question			Answer	Mark	Guidance
		ii	**preparation phase** - *any **two** from:* sit down the patient ✓ wrap it (the cuff/band) around the (upper) arm ✓ secure the cuff using, catches/Velcro ✓ make sure that rubber tube of cuff is on, inner arm, in direction of, lower arm/hand ✓ hold arm at heart level ✓ **equipment phase -** *any **four** from:* turn on the (digital equipment) ✓ wait for equipment to, tare/show zero reading ✓ start the reading / push relevant button ✓ record / download the (two) values / reading shown ✓ turn off the equipment before removing, cuff/band, ✓	**6**	**REJECT** wrist / elbow
		iii.1	90 ✓ 50 (mmHg) ✓	**2**	**ACCEPT** +/- 2 for each reading
		iii.2	as systolic pressure increases so does diastolic pressure ✓	**1**	**ACCEPT** systolic pressure divided into atrial and ventricular phases / the initial pressure created by systole influences the extent of relaxation/ diastole

Question			Answer	Mark	Guidance
	d		**potential risk** - *any **one** from:* wounding from (hypodermic) needle ✓ blood spillage ✓ being contaminated / catch a disease/ infection (from blood) ✓ **safety precautions** wear protective clothing / named example (e.g. gloves) ✓ following protocols/ procedures (for handling and disposing of, needles/sharps / handling blood) ✓ **dealing with an accident** - *any **one** from:* stay calm / don't panic ✓ wash/sterilise**/**clean, (skin/equipment) ✓ inform someone ✓ record incident / details ✓ **level of risk** low (level of risk) **and** an appropriate explanation	**5**	hazard given as 'handling patient's blood' **IGNORE** wearing goggles **IGNORE** 'be extra careful'/ handle correctly e.g. low risk because nurse is trained/ qualified to take blood samples / correct procedures in place
	e	i	*any **two** from:* may correct, heart/circulatory, problem ✓ could extend life expectancy / enhance quality of life / return of energy levels ✓ may reduce overall cost (in the long term) ✓	**2**	OWTTE
		ii	*any **two** from:* risk of lady dying/ deteriorating following surgery ✓ cost of surgery / money could be used for other (younger) patients ✓ may not be successful ✓ cause of stress/ discomfort/ pain ✓ patient may not understand treatment ✓ increased risk of infection ✓	**2**	**IGNORE** too old
			Total	**26**	

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Mark</th><th>Guidance</th></tr>
<tr><td>4</td><td>a</td><td></td><td>
<table>
<tr><td rowspan="2">structure</td><td colspan="4">feature</td></tr>
<tr><td>cartilage</td><td>goblet cells</td><td>smooth muscle</td><td>cilia</td></tr>
<tr><td>trachea</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>bronchus</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>large bronchiole</td><td>X</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>alveolus</td><td>X</td><td>X</td><td>X</td><td>X</td></tr>
</table>
</td><td>4</td><td>one mark for each correct row

MUST show a response in each box</td></tr>
<tr><td></td><td>b</td><td></td><td>goblet cells produce mucus ✓
mucus is moved by the cilia ✓</td><td>2</td><td>OWTTE</td></tr>
<tr><td></td><td>c</td><td></td><td>(goblet cells), produce more mucus / become more active ✓</td><td>1</td><td>ACCEPT a clear description to explain ‘more’
IGNORE ‘lots of’</td></tr>
<tr><td></td><td>d</td><td></td><td>tidal volume will, decrease/become shallow ✓
difficult for the air to get/ to breath in and out /
less air can be breathed in and out/ airways are narrower ✓</td><td>2</td><td>ACCEPT airways partially blocked by mucus</td></tr>
</table>

Question			Answer	Mark	Guidance
	e	i	**[Level 1]** Candidate shows a high level of understanding and gives a full explanation of how a spirometer can be used to measure vital capacity, including **at least four** valid points from across the two phases expressed clearly and the explanation follows a logical order. ***(4-5 marks)*** **[Level 2]** Candidate shows an understanding, explaining the basic principles of how a spirometer can be used to measure vital capacity, including **at least three** valid points from across the two phases not always expressed clearly and the explanation may not always follow a logical order. ***(2 - 3 marks)*** **[Level 3]** Candidate shows a basic understanding of how a spirometer can be used to measure vital capacity, including at least **two valid points**(taken from any section) but with little or no explanation. ***(1 mark)***	**5**	***valid points for spirometer use*** *include:* *preparation phase* • fill (spirometer) with (medical grade) oxygen • subject must be sitting/ at rest/ relaxed • rinse mouthpiece in antiseptic/ cleansing solution/ sterilised • put mouthpiece in subject/ patient's mouth • put nose clip on subject/ patient's nose *using equipment and processing data* • turn tap to connect subject/ patient (to spirometer chamber) • start recorder / record normal breathing (for approximately 1 minute) • ask subject/ patient to take a deep breath in and out • return to normal breathing • analyse the results/ measure volume from maximum inspiration to maximum expiration
		ii	to make sure that the, highest/maximum, reading is obtained ✓	**1**	**REJECT** average/ reliability **ACCEPT** to obtain the best possible reading
		iii	oxygen levels will increase **and** carbon dioxide levels will decrease ✓	**1**	**MUST** refer to both gases
			Total	**16**	

Question			Answer	Mark	Guidance
5	a	i	**ATP** – decreases ✓ *explanation – any two from:* insufficient, oxygen/glucose, delivered (to muscles) ✓ glycogen/glucose, reserves used up (in muscles) ✓ ATP used in <u>muscle</u> contraction/ work/ by <u>muscles</u> ✓	3	**ACCEPT** use of values but must show **correct** decrease (from 4.5 to 3.3/ drop of 1.2) **IGNORE** references to tissues/cells OWTTE for explanations
		ii	**glycogen** – decreases ✓ *explanation – any two from:* contracting muscles need energy ✓ respiration rate increases ✓ broken down to release <u>glucose</u> (for respiration**)** ✓	3	**ACCEPT** use of values but must show **correct** decrease (from 84.0 to 56.2/ drop of 27.8) OWTTE
		iii	**lactic acid** – increases *and the following explanation:* <u>anaerobic</u> respiration taking place (which releases lactic acid) ✓	1	**ACCEPT** use of values but must show **correct** increase (from 1.2 to 30.8/ increase of 29.6)
	b		(lactic acid) is toxic / affects other reactions in cells ✓	1	**ACCEPT** (lactic acid) is poisonous / causes muscle fatigue **REJECT**cramp **IGNORE** harmful**/ ache/ damage**
	c		*any **two** from:* nerve impulse transmission ✓ active transport ✓ (named) metabolic reaction ✓	2	OWTTE **Accept one from eg.** sperm swimming, cilia beating, protein synthesis, glycolysis, cell reproduction
	d		*any **two** from:* red blood cell/ erythrocyte/ RBC count ✓ oxygen / carbon dioxide, levels ✓ lactic acid levels ✓ <u>glucose</u> levels ✓	2	OWTTE
			Total	12	

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