Mark scheme – Monitoring & Maintaining Health (F)

Question			Answer/Indicative content	Marks	Guidance
1			C ✓	1 (AO2.2)	
			Total	**1**	
2			D	1	
			Total	**1**	
3			D ✓	1 (AO1.1)	
			Total	**1**	
4			the blood is less likely to clot / wounds bleed for longer/longer to heal ✓	1 (AO1.1)	**ALLOW** bruise easily / excessive bleeding **ALLOW** tiredness / fatigue / infections
			Total	**1**	
5	a		mitosis ✓	1 (AO1.1)	
	b		lung ✓	1 (AO2.2)	
			Total	**2**	
6			B	1	
			Total	**1**	
7			D	1	
			Total	**1**	
8			A	1	
			Total	**1**	
9			B	1	
			Total	**1**	
10			C	1	
			Total	**1**	
11			A	1	
			Total	**1**	
12			A ✓	**1 (AO1.1)**	

			Total	**1**	
13			A	1	
			Total	**1**	
14			B	1	
			Total	**1**	
15			D	1	
			Total	**1**	
16			B	1	
			Total	**1**	
17			B	1	
			Total	**1**	
18			C	1	
			Total	**1**	
19			A ✓	**1 (AO1.1)**	
			Total	**1**	
20			D ✓	**1 (AO1.1)**	
			Total	**1**	
21			B	1 (AO 2.2)	
			Total	**1**	
22			B	1 (AO 1.2)	
			Total	**1**	
23			B	1 (AO 1.1)	
			Total	**1**	
24			D	1 (AO 1.1)	
			Total	**1**	

25			idea that it is a sign of the extent of the disease (1) temperatures far away from normal can be dangerous (1)	1 1	
			Total	**2**	
26					**Allow** broken down
			two from: a chemical (usually) made by fungi / microbes (1) that kills (other) microbes / kills bacteria (1)	1 1	
			Total	**2**	
27			antigens ✓ white blood cells ✓	2 (AO 1.1)	**Examiner's Comments** This question differentiated well, with the majority of higher ability candidates correctly gaining full marks here and the lower ability candidates did not. This question required the candidates to demonstrate their knowledge and understanding on the immune response.
			Total	**2**	
28			**two from:** a chemical (usually) made by fungi / microbes (1) that kills (other) microbes / kills bacteria (1) does not destroy viruses (1)	1 1	
			Total	**2**	
29	a	i	as a control / to compare the results ✓	1 (AO 1.2)	**ALLOW** show the drug is having the effect/works /no psychological effect **Examiner's Comments** This question was correctly answered by about half of all candidates, which required demonstration of their knowledge of the role of a placebo group. Most responses which didn't score focused on the placebo not receiving the antibody, which repeated the stem of the question.
		ii	**FIRST CHECK ANSWER ON THE ANSWER LINE** **If answer = 75 (patients) award 2 marks** 480/6.4 ✓ =75 (patients) ✓	2 (AO 2.2)	**Examiner's Comments** Just over half of candidates were able to correctly calculate the number of patients in the placebo group. This question contributed to the papers ten percent allocation to the mathematical element.
	b		**Any two from:**for peer review ✓	2 (AO 2.2)	**IGNORE** get accurate results

<table>
<tr><td></td><td></td><td></td><td>idea of checking the results ✓
to increase the number of patients tested ✓

conclusions more valid ✓</td><td></td><td>ALLOW check for safety/bias

ALLOW conclusions are more reliable

<u>Examiner's Comments</u>

The majority of candidates did not gain full marks on this question, but a significant number of candidates gained one mark. The most common awarded mark was the idea of checking. Most candidates did not use the accepted language of measurement and the correct use of the term validity.</td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>5</td><td></td></tr>
<tr><td>30</td><td></td><td>i</td><td>FIRST CHECK THE ANSWER ON ANSWER LINE
If answer = 10 000(per mm^3) award 2 marks

1000 ÷ 0.1 OR 1000 x 10 ✓

= 10 000 (per mm^3) ✓</td><td>2 (AO2 x 2.2)</td><td></td></tr>
<tr><td></td><td></td><td>ii</td><td>no (no mark)
(because 10 000) is in the normal range / levels / range without Fanconi anaemia✓</td><td>1 (AO3.2 a)</td><td>ALLOW ECF from (i)

ALLOW 10 000 is between 6000 and 16000</td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>3</td><td></td></tr>
<tr><td>31</td><td></td><td></td><td>
<table>
<tr><th colspan="3">Communicable disease</th><th>Non-communicable disease</th></tr>
<tr><th>Caused by a disease bacterium</th><th>Caused by a fungus</th><th>Caused by a virus</th><th></th></tr>
<tr><td>crown gall disease</td><td>barley powdery mildew</td><td>AIDS</td><td>type 2 diabetes</td></tr>
</table>

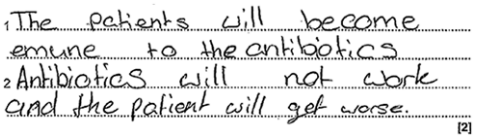
✓✓✓</td><td>3 (AO 1.1)</td><td>4 correct = 3 marks,
2 or 3 correct = 2 marks,
1 correct = 1 mark

<u>Examiner's Comments</u>

The majority of candidates were able to achieve at least one mark on this question which required demonstration of knowledge and understanding on causes of various diseases. Roughly half of all candidates were given full marks.</td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>3</td><td></td></tr>
<tr><td>32</td><td></td><td>i</td><td>7.5 (years) (1)</td><td>1</td><td></td></tr>
<tr><td></td><td></td><td>ii</td><td>10 years (1)</td><td>1</td><td></td></tr>
<tr><td></td><td></td><td>ii</td><td>idea of time between two peaks (1)</td><td>1</td><td></td></tr>
</table>

			Total	**3**	
33			blood vessels / arteries are blocked/narrowed ✓ (heart muscle) gets less blood ✓ (heart muscle) gets less oxygen ✓	**3 (AO 2.1)**	**ALLOW** atheroma / plaque formed **IGNORE** no blood **IGNORE** no oxygen **IGNORE** references to blood circulation to body cells **Examiner's Comments** Over half of candidates scored at least one mark here mainly for less blood flow (to the heart muscle). A lot of candidates got confused with the blood flow to the heart muscle with blood flow to the body cells, therefore not gaining credit. Exemplar 8 demonstrates this confusion and is not credited any marks. **Exemplar 8** Use the information in the diagram and your biological knowledge. The lack of consistent, potent flow of bl the body causes the body to have to adapt a blood flow means and causes a lack of oxygen The body includes around this by using anae respiring to ensure enough respiration occurs in the
			Total	**3**	
34		i	any higher and the bacteria might be killed / bacterial enzymes denatured (1)	1	**allow** optimum temperature for the bacteria / bacterial enzymes
		i	any lower and the erythromycin would diffuse slower / bacteria would reproduce more slowly so takes longer to get the results (1)	1	**allow** spread out slower
		ii	prevent contamination by other microbes (1)	1	**not** germs / bugs
			Total	**3**	
35		i	idea that it widens/opens the (lumen) of the artery ✓ more blood/oxygen will be able to reach the heart muscle ✓	**1 (AO 2.2)** **1 (AO 3.1b)**	**IGNORE** expands the artery **Examiner's Comments** Most common credited mark was for the idea the stent widens/opens up the artery. Few candidates stated that more blood/oxygen would be able to reach the heart muscle.

		ii	advantage: avoids an operation ✓ disadvantage: could be side effects of the drug / must take it on a regular basis ✓	**2 (AO 2 × 2.1)**	**ALLOW** named side effect e.g. liver damage/upset stomach **ALLOW** may forget to take the drug / misuse of the drug **Examiner's Comments** Most candidates didn't gain the marks for the advantage of taking statins because they just repeated the question and stated it lowers the level of cholesterol in a person's blood. A number of candidates achieved the disadvantage marking point, with the most common answer being that they have to take it on a regular basis. A number of candidates stated that the blood cholesterol would become too low, which wasn't credited.
			Total	**4**	
3 6		i	idea that stem cells are not differentiated / can still specialised✓ they can replace damaged cells / develop into/change/divide/become retina cells ✓	**2 (AO 1.2)**	ALLOW stem cells are unspecialised / can differentiate/grow into any (type of) cell **ALLOW** can differentiate/specialise into retina cells = 2 marks **IGNORE** can repair retina **Examiner's Comments** There were some good examples demonstrating their knowledge and understanding of stem cells in this answer. Most common non-credited answers were just repeating the question that they can repair the retina but not describing how. Exemplar 6 gained full marks. **Exemplar 6** Why might stem cells be able to repair the retina? stem cells are undifferentiated cells, meani they can be modified to do anything. S scientists are able to modify stem cells t replace the faulty cells in the retina.
		ii	any two from: to see if it works ✓ make sure it is safe / identify side effects✓ to find the correct dosage✓	**2 (AO 1.2)**	**ALLOW** see results **ALLOW** could go wrong / unknown effect **IGNORE** can't test on humans **Examiner's Comments** The vast majority of candidates scored at least 1 mark here for side effects / make sure it is safe. The least scored marking point was to find the correct dosage.

			Total	**4**	
37			skin forms a barrier (1) enzymes in tears (1) acid in the stomach (1) acid / enzymes break down microbes (1)	1 1 1 1	
			Total	**4**	
38		i	viruses are not destroyed/killed by antibiotics ✓ wants to avoid the spread of antibiotic resistant (bacteria) ✓	2 (AO 2.1)	**ALLOW** antibiotics are ineffective in treating viruses / antibiotics only kill bacteria **DO NOT ALLOW** viruses can become antibiotic resistant **Examiner's Comments** Candidates found this question one of the most challenging on the paper. Only the higher ability students scored a mark here, with the most common mark awarded for antibiotics only work on bacteria or don't work on viruses. There were a lot of responses which were too vague and not specific. Very few candidates were given the antibiotic resistance mark. **Misconception** Candidates demonstrated confusion between immunity and resistance to antibiotics. Exemplar 3 highlights this misconception **Exemplar 3**  1 The patients will become emune to the antibiotics 2 Antibiotics will not work and the patient will get worse. [2]
		ii	virus sinusitis patient's should be getting better / the symptoms should have disappeared/only last 14 days ✓ any symptoms/infection (after 14 days) is caused by bacteria ✓	2 (AO 3.1a)	**IGNORE** time for bacteria need to grow **Examiner's Comments** This question required the candidates to analyse and interpret the graph. There were some good responses that correctly explained why doctors wait 14 days after infection before giving antibiotics.
			Total	**4**	
39	a		idea that water is added from (each) lake to a (separate) Petri dish using (sterile) pipette ✓ filter paper/antibiotic disc is	4 (AO4 x 1.2)	

			placed in (the centre of) each dish with the (sterile) forceps ✓ Petri dishes are incubated ✓ idea that the inhibition zone/clear area/area with no bacteria growth around the discs is measured ✓		**ALLOW** idea of repeats **ALLOW** idea of setting up a control
	b		Lake Bellandur– no mark **Any two from:** more (antibiotic) resistant bacteria / more species of bacteria are resistant to antibiotics / ORA ✓ Lower number of bacteria killed by antibiotics / less species of bacteria killed by antibiotics / ORA ✓ this lake contains a higher ratio of resistant bacteria compared to bacteria killed by antibiotics✓ (antibiotic) resistant bacteria more likely to survive/reproduce with more (antibiotic) pollution ORA✓	2 (AO2 x 3.2a)	Incorrect or no lake given then no marks **ALLOW** bacteria are more resistant (antibiotic) **DO NOT ALLOW** more resistant to bacteria **IGNORE** immune **ALLOW** only 28 species are killed **ALLOW** idea of natural selection causing increased resistant bacteria with more (antibiotic) pollution
			Total	**6**	
40		i	to prevent other people taking in the microbe (1)	1	**allow** to prevent other microbes starting to grow / contamination **allow** to prevent release of the bacteria if the dish is dropped / knocked
		ii	correct area = 452(mm^2) (3) or correct measurement of diameter to calculate radius (1) correct calculation using calculated radius (2)	3	**allow** 452.2
		iii	not resistant (1)	1	**allow** ECF from (ii)
			Total	**5**	
41		i	use Benedicts (reagent) ✓ heat / boil ✓ no change in colour / stays blue / does not go red ✓	3 (AO3 x 1.2)	

		ii	Yes (no mark) blood sugar levels will be controlled/not rise ✓ idea of a sugar replacement ✓	2 (AO1 x 3.2a) (AO1 x 2.1)	If No chosen = 0 marks **IGNORE** blood sugar levels will decrease **ALLOW** less sugar eaten
			Total	**5**	
4 2		i	Three / 3 ✓	**1** **(AO 2.2)**	**Examiner's Comments** The majority of candidates scored this mark. Those who didn't gain the mark incorrectly identified the age range 31-40 instead of the number of points.
		ii	the older a person is, the greater the risk ✓	**1** **(AO 3.1a)**	**ORA** **IGNORE** the older the more points
		iii	Person A has total of 8 points ✓ Person B has a total of 7 points ✓ Person A has a greater risk ✓	**1** **(AO 2.2)** **1** **(AO 2.2)** **1** **(AO 3.2b)**	**If no totalled points on the answer lines then check text boxes** must be correct deduction based on the total of points **ALLOW** correct deduction even if there is an error in the calculation of points **Examiner's Comments** Most candidates scored at least one mark here for person A. Higher ability candidates achieving full marks here was common.
			Total	**5**	
4 3		i	correct area = 452(mm^2) (2)	2	**allow** 452.2
		i	not resistant (1)	1	**allow** one mark for correct calculation and interpretation using incorrect radius
		ii	only one plate used / no replicates (1)	1	
		ii	only gives limited information ie one of three choices (1)	1	
			Total	**5**	
4 4		i	number of people having strokes is the same after pollution compared to when there is no pollution (1)	1	
		i	pollution is not a risk factor in strokes (1)	1	
		ii	ozone (1)	1	
		iii	data from 28 countries / 6 million people / large sample (1)	1	

		iii	even a small risk factor number means a lot of people (were affected) (1)	1	
			Total	**5**	
4 5			Please refer to the marking instructions on page 4 of this mark scheme for guidance on how to mark this question. **Level 3 (5–6 marks)** Provides a detailed explanation linking cholesterol to heart disease. **AND** Provides a detailed analysis to explain if this link is supported by the graph. *There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.* **Level 2 (3–4 marks)** Provides a detailed explanation linking cholesterol to heart disease. **OR** Provides a detailed analysis to explain if this link is supported by the graph. **OR** Provides a basic explanation linking cholesterol to heart disease. **AND** Provides a basic analysis of the information to explain if this link is supported by the graph. *There is a line of reasoning presented with some structure. The information presented is relevant and supported by some evidence.* **Level 1 (1–2 marks)** Provides a basic explanation linking cholesterol to heart disease. **OR** Provides a basic analysis of the information to explain if this link	6 (AO2 x 1.1) (AO2 x 2.1) (AO2 x 3.1b)	**AO1.1 Demonstrate knowledge and understanding of the importance of the blood supply to the heart muscle.** • coronary artery carries blood to heart/muscle • blood takes oxygen/glucose to the heart/muscle • heart/muscle carries out aerobic respiration/needs energy • energy is needed for the heart/muscle to contract **AO2.1 Apply knowledge and understanding of the requirements of the heart muscle** • cholesterol build up (partially) blocks the blood flow in the artery • this reduces blood/oxygen/glucose carried to the heart/muscle • heart/muscle carries out less aerobic respiration/less energy released • heart/muscle can't contract as forcefully **AO3.1b Analyse information and ideas to interpret the results on the study** **Support the link:** • men with heart disease had (on average) a higher blood cholesterol level. • Men without heart disease had (on average) a lower blood cholesterol level. • build-up of cholesterol can lead to heart disease **Doesn't support the link:** • considerable overlap between the two groups • men can still have heart disease with low blood cholesterol levels • Men without heart disease can still have high blood cholesterol levels

			is supported by the graph. **OR** Demonstrates knowledge of the importance of the blood supply to the heart muscle. *There is an attempt at a logical structure with a line of reasoning. The information is in the most part relevant.* **0 marks** *No response or no response worthy of credit*		
			Total	**6**	
46		i	a communicable disease ✓ a disease that is caused by defective alleles a non-communicable disease a disease that is affected by lifestyle ✓	1	Both correct answers are required for the mark
		ii	antibodies (1)	1	
		iii	idea that it stops blood flowing backwards (1)	1	
		iii	inefficient circulation to lungs / less blood would go to the lungs (1)	1	
		iii	Increased ventilation required for gaseous exchange (1)	1	
		iii	idea of less oxygen available to the tissues / fatigue / oxygen debt (1)	1	
			Total	**6**	
47	a		quadrat ✓	1 (AO 1.2)	**Examiner's Comments** The majority of higher ability candidates gained this mark. Those candidates that didn't score couldn't recall the piece of equipment as a quadrat. Common errors included square frame and Punnett square.
	b	i	**FIRST CHECK ANSWER ON THE ANSWER LINE** **If answer = 0.1 (%) award 3 marks** 10x0.25 or 2.5 (m^2)✓ 2.5 ?00 / 0.001 ✓	3 (AO 2 x 2.2)(AO 1.2)	**ALLOW** correct conversion of the fraction of the area sampled into a percentage **Examiner's Comments** Just over half of candidates did not achieve any marks for this mathematical application question and lower ability candidates found

			= 0.1 (%) ✓		having to work out the fraction of the field sampled then convert it into a percentage challenging. The candidates benefited if they showed their working out as there was an error carried forward mark for the correct percentage from an incorrect fraction.
		ii	(student **A**): has taken more samples/quadrats than B ✓ has sampled all over/spread out/ random over the marsh ORA ✓ samples more likely to be representative / not bias / valid ✓	3 (AO 3.1a x2) (AO 3.2a)	**If student B chosen = No marks** **IGNORE** A = 10 and B = 8 samples **IGNORE** plants more spread out **Examiner's Comments** The majority of higher ability candidates achieved at least one mark here, with the most common credited mark that student A's sample was random. Very few candidates appreciated the sample would be more valid/representative, using the accepted language of measurement.
		iii	**Any two from:** wash hands (after sampling) ✓ not to eat / do not put hands to mouth (whilst sampling) ✓ protective clothing (whilst sampling) ✓ Cover cuts with plasters ✓	2 (AO 3.3b)	**ALLOW** sterilise equipment after use **Examiner's Comments** Half of candidates achieved one mark on this question. The most common credited response was protective clothing, which was given by candidates analysing the information and making suggestions to improve experimental procedures.
			Total	**9**	
4 8		i	coat is digested (1)	1	
		i	by enzymes present in small intestine (1)	1	
		ii	* Please refer to the marking instructions on point 10 for guidance on how to mark this question. **Level 3** **(5–6 marks)** **Explains the shapes of the two graphs in the effectiveness / safety of the drugs delivery system.** *There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.* **Level 2** **(3–4 marks)** **Explains the shapes of the two graphs the total dosage**	6	**AO3.2a: Analyse the information and judge the relative effectiveness of the two delivery systems** • links this to the advantages / disadvantages of keeping a steady, intermediate level in the blood • with tablet high levels may be toxic • if reduce the dose, then when levels low it may not kill all bacteria • reference to allowing resistant strains to develop **AO2.2: Apply knowledge to demonstrate an understanding of how the capsules and tablets work in delivering the drug** • any statement regarding the total dosage for the two delivery methods • dosage rises rapidly because of rapid absorption into the blood stream • dosage falls fast because it is rapidly broken down • capsules allow staggered release of drug dosage • this is because walls are different thicknesses of the capsule

			of the drugs. *There is a line of reasoning presented with some structure. The information presented is relevant and supported by some evidence.* **Level 1** **(1–2 marks)** **Simply describes the patterns in the graph.** *The information is basic and communicated in an unstructured way. The information is supported by limited evidence and the relationship to the evidence may not be clear.* **0 marks** *No response or no response worthy of credit.*		• therefore different digestion time • conventional tablet releases drug all at once • tablet may not have a coating **AO2.1: Apply knowledge and understanding in reading the graphical information** • Simple description of the patterns of the two lines on the graph.
			Total	**8**	