Question	Answers	Extra information	Mark	AO / Specification reference
01.1	any disease of the heart or blood vessels		1	AO1 4.2.2.6 MS 1c
01.2	22%		1	AO2 4.2.2.5 4.2.2.6 MS 1c
01.3	33 000	award 1 mark for 0.22 × 150 000	2	AO2 4.2.2.5 4.2.2.6

Question	Answers	Extra information	Mark	AO / Specification reference
01.4	• eat less fatty foods which would reduce the build-up of cholesterol which would lead to blocked arteries • ensure energy input in food matches daily energy expenditure / maintain a healthy weight to prevent excess food being stored as fat • (if obese) exercise more / consume less food / energy than daily requirement to lose excess weight • stop smoking / do not smoke as smoking narrows blood vessels / damages artery lining / increases risk of clot formation / increases blood pressure	to award 6 marks, answers should include three lifestyle factors with three linked explanations accept other acceptable answers with linked explanations	6	AO1 4.2.2.6
02.1	a stent is a small mesh tube inserted into a blood vessel blood vessel is enlarged / it holds blood vessel open blood flow through the blood vessel is increased		1 1 1 1	AO1 4.2.2.4

Question	Answers	Extra information	Mark	AO / Specification reference
02.2	**risks** any **two** from: • complications may occur – bleeding / allergic reactions / irregular heartbeat • arteries sometimes re-close • patient needs to take blood thinning drugs **benefits** any **two** from: • long-term success rate is high • lowers the risk of a heart attack in people with coronary heart disease • lower risk of death / heart attack / stroke than receiving a bypass operation		2 2	AO3 4.2.2.4
02.3	patients dying following stent = 120 patients dying following bypass = 145 difference = 25	award 2 marks for 0.02 × 1250 award 1 mark for 0.116 × 1250 or 0.096 × 1250	1 1 1	AO2 4.2.2.4 4.2.2.5 MS 4a

Question	Answers	Extra information	Mark	AO / Specification reference
03.1	any **two** from: • all risk factors show a decrease • smoking levels have decreased the least (compared to 1972) • the greatest decrease has been seen in people with cholesterol above recommended levels • smoking has not shown a continual decline / increased in the 1990s	accept other alternative trend from the data	2	AO2 4.2.2.4 4.2.2.5 4.2.2.6
03.2	any **four** from: • better education / positive results from public health campaigns (linked to any risk factor) • meaning people make positive lifestyle choices • better diet • leading to reduced cholesterol / blood pressure • (linked to any risk factor) • (significantly) fewer deaths due to CVD • because key risk factors for CVD have all reduced / improved healthcare	answers should include two suggestions and two linked reasons to award 4 marks accept other reasonable suggestions with linked effects on lifestyle / mortality rates	4	AO3 4.2.2.4 4.2.2.5 4.2.2.6

Question	Answers	Extra information	Mark	AO / Specification reference
03.3	fatty material / cholesterol builds up in coronary arteries reduces blood flow less oxygen / glucose reaches the heart muscle / less respiration of heart muscle cells.		1 1 1	AO1 4.2.2.4
03.4	statins		1	AO1 4.2.2.2
03.5	130	accept proportion of deaths = 20% of 1972 level (650) award 2 marks for 0.2 × 650	3	AO3 4.2.2.4 4.2.2.5 MS 1c
03.6	any **three** from: • data correlate with the conclusion, supporting the conclusion made • data do not give causation • population studied may have been atypical • data are collected from one (isolated) population and so generalities may not be drawn to all populations • other risk / lifestyle factors were not noted which may have had an underlying effect on the outcomes	accept other reasonable statement	3	AO3 4.2.2.4

Question	Answers	Extra information	Mark	AO / Specification reference
04.1	a correlation means there is a link between a factor and a disease (however the risk factor does not necessarily cause the disease)		1	AO1 4.2.2.6
	causation means that an increase in the risk factor results in an increase in the incidence of the disease.		1	
04.2	age / genes		1	AO1 4.2.2.6
04.3	a disease caused by cell division / growth of cells / cell multiplication / mitosis		1	AO1 4.2.2.7
	that is out of control / abnormal / uncontrolled		1	
04.4	UV light in sun causes changes in DNA / mutations		1	AO1 4.2.2.7
	(if not corrected by body) this can lead to uncontrolled cell division		1	
04.5	benign tumours are contained within a membrane	accept converse answer	1	AO1 4.2.2.7
	don't invade nearby tissue / can't spread (not cancerous)		1	
	to form secondary tumours		1	
05.1	to prevent backflow of blood		1	AO2 4.2.2.2
	from left ventricle (into left atrium)		1	

Question	Answers	Extra information	Mark	AO / Specification reference
05.2	any **three** from: • leaky valve can allow blood to flow backwards • full amount of blood does not leave heart • blood coming into heart chamber mixes with blood that hasn't left, making heart less efficient • not enough blood / oxygen carried around the body / person breathless		3	AO1 4.2.2.4

Question	Answers	Extra information	Mark	AO / Specification reference
05.3	**advantages of mechanical heart valve** • the valve will last longer • will require fewer additional surgical procedures in the future • not made from an animal product which some people may object to on ethical grounds • less chance of body rejection as not using tissue from another organism **disadvantages of mechanical valve** • newer technique – less proven track record / less evidence of any potential long term risks • patient has to take permanent medication **disadvantages of both / either valve** • patient will require further procedures in the future • both carry risk of rejection • both carry risk of infection	to award full marks, answers should include comparative statements between the two types of heart valve, considering at least three factors linked to the two types of valve accept converse statements if answers linked to biological valve	6	AO3 4.2.2.4

Question	Answers	Extra information	Mark	AO / Specification reference
06.1	any **two** from: • artificial heart is not living • the artificial heart needs an external power supply • the artificial heart only consists of / replaces ventricles		2	AO2 4.2.2.2 4.2.2.4
06.2	**advantages** – any **two** from: • prolongs patient's life when waiting for heart transplant • improves the quality of life for the patient • no tissue match required • heart is not rejected by the body's immune system • no need for immunosuppressant drugs **disadvantages** – any **two** from: • battery needs (regular) charging • artificial hearts do not work as well as natural hearts / parts can wear out • blood clots can occur so blood thinning drugs (e.g. warfarin) need to be administered • surgery can cause complications / infection	accept any other appropriate suggestions	2 2	AO3 4.2.2.4

Question	Answers	Extra information	Mark	AO / Specification reference
06.3	any **one** from: • expensive • do not last / work for long period of time • requires additional surgery, which has infection risks	accept other reasonable suggestion	1	AO3 4.2.2.4
07.1	21.3 (kg/m^2)	accept $\frac{48}{1.5^2}$ for 1 mark	2	AO2 4.2.2.5 4.2.2.6 MS 1c
07.2	healthy weight		1	AO2 4.2.2.5 4.2.2.6 MS 3a

Question	Answers	Extra information	Mark	AO / Specification reference
07.3	any **six** from: • obesity is a condition where a person is very overweight • obese people have an abnormal amount of excess body fat (beneath the skin) • obesity is a risk factor for cardiovascular disease • obesity leads to high blood pressure / the build-up of fatty deposits in the arteries • fatty deposits in the coronary arteries reduce the oxygen reaching the heart, causing a heart attack • build-up of fat / lipids in the abdomen increases blood pressure • obesity increases the risk of type 2 diabetes • where the body's cells lose their sensitivity to insulin – they no longer respond, or respond less effectively, to the insulin that is produced • fat intake and obesity increases the risk of certain cancers		6	AO1 4.2.2.5 4.2.2.6

Question	Answers	Extra information	Mark	AO / Specification reference
07.4	greater level of exercise (in population) means more energy expended than previously any **one** from: • reduces the number of people for whom energy intake > energy required • fewer people would become obese in future • larger number of people for whom energy required > energy intake • excess fat will be used to supply energy so these (obese) people would lose weight	to award two marks, answer should include energy comparison and effect on population of obese people	1 1	AO3 4.2.2.5 4.2.2.6

Question	Answers	Extra information	Mark	AO / Specification reference
07.5	**costs** • drug likely to be very expensive to prescribe • so the drugs company can make their development costs back (and make a profit) • so cost to NHS / users will be high • creates viewpoint (amongst public) that a drug can repair poor lifestyle choices • which may encourage more people to make unhealthy lifestyle choices • creating a dependency on the drug / leading to other health consequences, e.g. avoiding exercise **benefits** • will reduce number of obese people • which will increase their life expectancy / improve quality of life • also reducing number of obesity-related conditions / named condition • cost to healthcare system / NHS due to obesity-related conditions reduced	to gain six marks, answers should include at least two costs and two benefits to society award 1 mark for each cost, benefit and linked explanation allow other reasonable suggestions	6	AO3 4.2.2.6

Question	Answers	Extra information	Mark	AO / Specification reference
08.1	fatty material builds up inside the coronary arteries causing them to narrow / lumen is reduced this reduces blood flow so less oxygen gets to the heart muscle		1 1 1 1	AO1 4.2.2.4
08.2	diet / inheritance		1	AO1 4.2.2.4
08.3	risk to patient of developing new condition is outweighed by / is smaller than positive impact of statins on risk of CVD	award 1 mark for risk to patient of other conditions is small award 1 mark for risk of developing oesophageal cancer also decreases	1 1	AO3 4.2.2.4 4.2.2.5
08.4	risk of liver disease in population = $\dfrac{4\,200\,000}{60\,000\,000}$ risk of liver disease 7% additional risk of liver disease due to statins = $\dfrac{75}{10\,000}$ additional risk = 0.75% statement quantifying risk as significant, e.g. risk is approx. 10% greater / insignificant, e.g. 0.75% is a very small risk		1 1 1 1 1	AO3 4.2.2.4 4.2.2.5 MS 1c
09.1	reduces blood flow reducing the amount of oxygen delivered to the heart		1 1	AO2 4.2.2.4

Question	Answers	Extra information	Mark	AO / Specification reference
09.2	use a stent / metal mesh		1	AO2
	small balloon inserted into the artery which is then inflated to open up the blood vessel		1	4.2.2.4
	stent stays in place to keep the artery open, allowing blood to flow		1	
09.3	any **four** from:		4	AO3
	• platelets are small fragments of cells			4.2.2.3
	• they stick together to form a blood clot			4.2.2.4
	• platelets could stick to wall, narrowing blood vessel further			
	• reduces the risk of a blood vessel being blocked further			
	• preventing loss of blood flow to the heart			
10.1	add Biuret reagent		1	AO1
	changes from blue to purple (if protein present)		1	4.2.2.1
10.2	too large / insoluble		1	AO3
				4.2.2.1
10.3	enzyme had been denatured		1	AO2
	enzyme's protein structure changed / active site altered		1	4.2.2.1
	lactase can no longer bind to lactose to break it down		1	

Question	Answers	Extra information	Mark	AO / Specification reference
10.4	37.5 °C this was the temperature at which digestion took the least time	accept 35–40 °C	1 1	AO3 4.2.2.1
11.1	1.29 h / 1.3 h / 1 h 18 min	award 1 mark for $\frac{36}{700}$ = 0.051 award 2 marks for 0.051 × 25 = 1.29	3	AO1 AO2 4.1.2.2 MS 3dd
11.2	any **four** from: Stage 1 • DNA replicates • cell grows bigger • increase in the number of subcellular components / mitochondria / ribosomes / other named component Stage 2 • mitosis • chromosomes line up in the middle of the cell in pairs • one set of chromosomes is pulled to each side of the cell Stage 3 • cell divides into two	to achieve four marks, answer should include information from all parts of the cell cycle	4	AO1 4.1.2.2

Question	Answers	Extra information	Mark	AO / Specification reference
12.1	cell membrane		1	AO2 4.1.3.2
12.2	volume of solution placed in Visking tubing / length of Visking tubing / temperature of solution in tubing		1	AO2 4.1.3.2
12.3	any **four** from: • cell 2 will shrink / decrease in size / decrease in mass / become flaccid • water will move out of the cell • as water concentration is higher inside the cell • cell 1 will expand / increase in size / increase in mass / become turgid • water will move into the cell • as water concentration is lower inside the cell	to gain four marks, answers should discuss the effect on both tubes, and include a detailed explanation for at least one tube	4	AO2 4.1.3.2