

Advanced GCE
Health and Social Care
Unit F921: Anatomy and Physiology in Practice
Specimen Paper

F921

Time: 1 hour 30 minutes

Candidates answer on the question paper.

Additional materials:

Candidate
Forename

Candidate
Surname

Centre
Number

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Candidate
Number

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INSTRUCTIONS TO CANDIDATES

- Write your name in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure you know what you have to do before starting your answer.
- Answer **all** the questions.
- Do not write in the bar codes.
- Do not write outside the box bordering each page.
- Write your answer to each question in the space provided.

INFORMATION FOR CANDIDATES

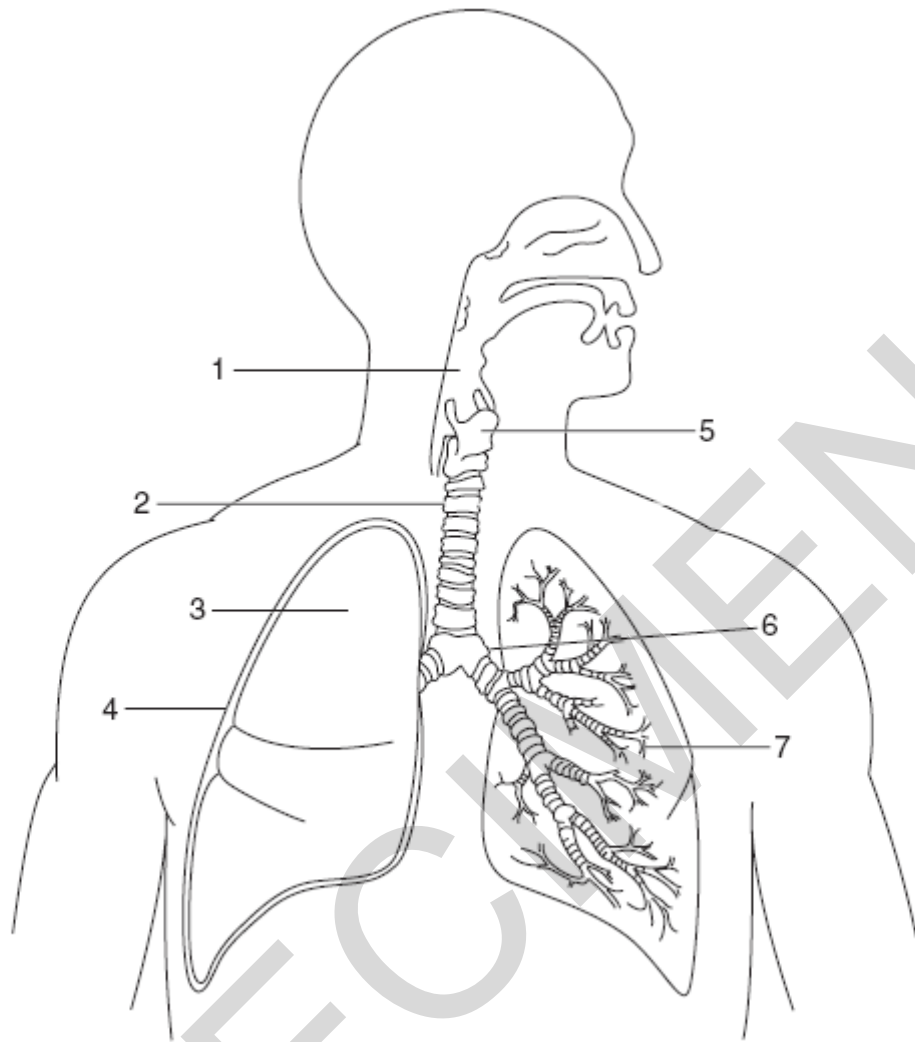
- The number of marks for each question is given in brackets [] at the end of each question or part question.
- Your Quality of Written Communication is assessed in questions marked with an asterisk (*).
- The total number of marks for this paper is 100.

FOR EXAMINER'S USE

1	
2	
3	
4	
5	
TOTAL	

This document consists of **11** printed pages and **1** blank page.

Answer **all** questions.



The Chest and Lungs

1 (a) Identify each of the structures labelled 1–7 in the diagram:

- 1.....
- 2.....
- 3.....
- 4.....
- 5.....
- 6.....
- 7.....

[7]

(b) Describe **two** functions of each part of the respiratory system given below.

Trachea.....
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Ciliated Lining.....
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Alveoli.....
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Diaphragm.....
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[8]

[Total 15]

SPECIMEN

2 (a) Describe the functions of the renal system

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[10]

(b)* Identify **one** renal dysfunction. Explain how this dysfunction would be treated.

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[10]
[20]

(c) (i) Describe **one** diagnostic technique that could be used to diagnose this dysfunction.

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(ii) Describe **one** treatment that would be required in the event of a positive diagnosis.

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[8]

[Total 20]

4 (a) Describe the three main functions of the musculo-skeletal system.

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..... [6]

(b) Describe a function of each of the following parts of the neural system.

Cerebral hemisphere
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Cerebellum
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Sensory neuron or nerve cell
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Myelin sheath.....
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Medulla oblongata
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..... [5]

SPECIMEN

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SPECIMEN

Question Number	Answer	Max Mark
<p>1(a)</p> <p>(b)</p>	<p>One mark for each correct response. Seven required from:</p> <ol style="list-style-type: none"> 1. pharynx / throat 2. trachea/ ring of cartilage/ windpipe 3. lung 4. pleura / lung membrane 5. larynx 6. bifurcation / bronchus / bronchi 7. bronchus / bronchiole <p>One mark for each correct function, TWO required for each from</p> <p>Trachea</p> <ul style="list-style-type: none"> • flexible fibro elastic and muscular structure to allow movement of the neck • connects the larynx with the bronchi • allows the transport of air to the lungs • cleaning air / traps dust • cartilage to keep trachea open • transport of CO₂ / O₂ from lungs <p>Ciliated Lining</p> <ul style="list-style-type: none"> • a collection of fine hairs that cover the inside of the trachea • they help to trap small particles and foreign bodies and move in waves in one direction back up towards the head • goblet cells / mucus moving, wafting <p>Alveoli</p> <ul style="list-style-type: none"> • small air sacs that allow the diffusion of oxygen across their membrane into red blood cells in the surrounding capillaries • they also allow the diffusion of carbon dioxide from the blood plasma to diffuse back into the alveoli • elasticised tissue to allow expansion • large surface area • moist to assist diffusion • one cell thick <p>Diaphragm</p> <ul style="list-style-type: none"> • a large dome shaped muscle that contracts and relaxes causing the chest cavity to increase and decrease in volume allowing the lungs to expand and contract (breathing) • it also forms the division between the abdomen and the thoracic cavity keeping the abdominal organs in their correct place • changing pressure / maintains pressure 	<p>[7]</p> <p>[8]</p>

Question Number	Answer	Max Mark
2(a)	<p>Level 3 [8-10 marks] Candidates will provide a fully developed description that includes accurate terminology and follows a logical sequence. Answer is supported by use of appropriate examples or opinions.</p> <p>Level 2 [5-7 marks] Candidates will provide a basic description that includes accurate terminology. Description of function will be accurate. Sentences and paragraphs are generally relevant but may have minor inaccuracies or lack clarity and depth of understanding.</p> <p>Level 1 [0-4 marks] Candidates' will provide an identification/simple description of at least one function (two functions for the top of this level). Their use of appropriate terminology will be limited. Description of function may be limited. blood is filtered in the glomeruli (Bowman's capsule) in the cortex of the kidney where waste products (urea and electrolytes) and excess water are filtered out under pressure</p> <p>(a) the urine produced collects in the calyces and drains into the pelvis of the kidney</p> <p>(b) Peristaltic waves transfer the urine down the ureter without reflux and into the bladder which is a large muscular sac. when the bladder is full, nerve sensations cause the bladder to contract under voluntary control forcing the urine through the urethra and out of the body</p> <p>(c) urine travel is in one direction only; system is designed not to reflux back</p> <p>(d) homeostasis, water balance processes as blood travels through enthron</p> <p><i>Note: reward candidates who produce annotated diagram.</i></p>	[10]

Question Number	Answer	Max Mark
2(b)*	<p>Level 3 [8-10 marks] Candidates will provide a fully developed explanation that includes accurate terminology. Development of the answer shows a logical sequence and clear understanding of the treatment. Answer is supported by use of appropriate examples or opinions. Candidate presents materials in a well planned and logical sequence. Answers will be factually accurate, using appropriate terminology. There will be few, if any, errors of grammar, punctuation and spelling.</p> <p>Level 2 [5-7 marks] Candidates will provide an accurate explanation that includes some accurate terminology. Principles of the treatment may be accurate. These may or may not be backed up with evidence. Answers will be factually correct with some use of appropriate terminology. Sentences for the most part relevant presented in a balanced, logical and coherent manner which addresses the question. There may be some noticeable errors of grammar, punctuation and spelling.</p> <p>Level 1 [0-4 marks] Candidate will provide a simple explanation. Their use of appropriate terminology will be limited. Principles of the treatment may be limited. The candidate has shown limited ability to organise the relevant material. Sentences have limited coherence and structure, often being of doubtful relevance to the main focus of question. Errors of grammar, punctuation and spelling will be noticeable and intrusive.</p> <p>Peritoneal dialysis</p> <ul style="list-style-type: none"> (a) uses the person's peritoneal membrane to act as a dialysis mechanism (b) it involves filling the abdominal cavity via a catheter with a dialysate solution in a closed system (c) waste products from the blood then diffuse across the peritoneal membrane (d) this may take several hours (e) the fluid is then drained back into the bag (f) this is replaced by a fresh bag of dialysate and the process is carried out again. <p>Haemodialysis</p> <ul style="list-style-type: none"> (a) involves filtering the blood through an artificial kidney called a dialyser (b) the patient has a semi-permanent arterio-venous shunt inserted into the vessels of their wrist so they can connect to the machine via an artery (c) inside the dialyser the blood is run through tubes or across a semi-permeable membrane on the other side of which is the dialysate (d) this allows waste products to be continuously removed as the dialysate is being constantly changed the cleaned (dialysed) blood enters the body through the shunt via a vein in the wrist 	[10]

Question Number	Answer	Max Mark
3(a)	<p>Renal transplant</p> <ul style="list-style-type: none"> (a) the operation lasts about four hours and is carried out under a general anaesthetic (b) a donor kidney that has been cross matched for acceptability is removed from the donor (c) the surgeon will make an incision in the abdomen either on the right or left side depending on where to insert the kidney (d) they do not usually remove failed kidneys unless they are causing problems (e) the new kidney will be placed above the pelvic brim and connected to the iliac vessels so that the kidney is supplied with blood (f) the ureter is then connected to the bladder so that urine can drain away (g) a stent (plastic tube) may be inserted to stop the ureter blocking (h) the kidney usually starts functioning immediately (i) anti-rejection drugs are taken by the patient to reduce the risk of rejection <p>Drug therapy</p> <ul style="list-style-type: none"> (a) treatment will be relative to the dysfunction chosen. eg the use of immuno-suppressant drugs with transplant patients or the use of anti-coagulants on dialysis patients etc <p>One mark for each correct response. Five required from:</p> <ol style="list-style-type: none"> 1. bladder 2. prostate 3. testicle / testes / gonad 4. eppididimus 5. urethra 	[5]

Question Number	Answer	Max Mark
3(b)(i)	<p><i>Level 3 [6-7 marks]</i> Candidates will provide a fully developed description of the chosen dysfunction that includes accurate terminology together with a detailed explanation of two possible causes.</p> <p><i>Level 2 [4-5 marks]</i> Candidates will provide a good general description of the chosen dysfunction that includes some accurate terminology together with a sound explanation of two possible causes.</p> <p><i>Level 1 [0-3 marks]</i> Candidates will provide an identification / simple description of the chosen dysfunction together with a basic explanation of two possible causes. Their use of appropriate terminology will be limited.</p> <p>Impotence</p> <ul style="list-style-type: none"> • the inability to maintain an erection of the penis which prevents the successful engagement in sexual intercourse - it can occur at any age and can be either temporary or long lasting • impotence can be psychological in origin caused by stress anxiety and depression or marital conflict • it can also be caused by physical problems such as stroke, atherosclerosis, diabetes, alcoholism, smoking • brief bouts may follow illness such as flu or taking medication or drugs (pain killers and heavy analgesics) • it can be a side effect of surgery such as bladder surgery, prostatectomy or spinal canal surgery <p>Infertility</p> <ul style="list-style-type: none"> • male infertility may be caused by the failure of the testes to produce viable sperm (azoospermia) • sperm may be weak and unable to complete the journey or fail to negotiate the cervix • they may also be low in number, fewer than 20 million per millilitre • the tubes of the vas deferens may be blocked or damaged by physical injury • problems may be caused by disease, a varicocele, mumps, cancer - also excessive alcohol and smoking • treatments such as cytotoxic drugs, radiation treatment or occupational exposure or working with certain chemicals such as solvents can cause infertility • insufficient nutrient secretions from the prostate may also cause infertility 	[7]

Question Number	Answer	Max Mark
3(b)(ii)	<p><i>Level 3 [7-8 marks]</i> Candidates will provide a fully developed description of the diagnostic technique that includes accurate terminology together with a detailed description of a treatment.</p> <p><i>Level 2 [4-6 marks]</i> Candidates will provide a good general description of the chosen dysfunction that includes some accurate terminology together with a sound description of a treatment.</p> <p><i>Level 1 [0-3 marks]</i> Candidates will provide an identification / simple description of the chosen dysfunction together with a basic description of a treatment. Their use of appropriate terminology will be limited. Errors of grammar, punctuation and spelling may be noticeable and intrusive.</p> <p>Impotence</p> <ul style="list-style-type: none"> • self diagnosis • clinical assessment • clinical electronic nerve stimulation • psychological assessment <p>Treatment</p> <ul style="list-style-type: none"> • psychological assessment and assessment of causes such as stress, relaxation therapy such as Yoga • therapy often focuses on complications surrounding performance anxiety, dysfunctional relationships, loss of a partner, psychotic disorders, substance abuse, etc • marriage guidance sessions to rebuild relationship where appropriate • implantation surgery, inflatable prosthetic bag inserted into the penis • three forms of penile prosthesis are currently available flexible, malleable and inflatable • flexible or malleable rods consist of two semi-rigid, flexible rods that make the penis firm enough for intercourse • needle injection therapy uses a hypodermic needle to inject medication that is a mixture of papaverine, phentolamine and prostaglandin into the side of the penis • the medication relaxes the smooth muscle tissue of the penis allowing for an erection • vacuum cup devices, works by placing a cylinder with an attached pump over the penis • the pump creates a vacuum in the cylinder, which pulls blood into the penis to create an erection • drug therapy such as sildenafil Cialis Levitra Uprima Viagra • the physiologic mechanism of erection of the penis involves release of nitric oxide (NO) in the corpus cavernosum during sexual stimulation 	[8]

Question Number	Answer	Max Mark
4(a)	<ul style="list-style-type: none"> • NO then activates the enzyme guanylate cyclase, which results in increased levels of cyclic guanosine monophosphate (cGMP), producing smooth muscle relaxation in the corpus cavernosum and allowing inflow of blood • treatment of vascular problems to increase blood flow, may involve both the arterial and venous systems • venous ligation has been reported to be effective in patients with venous leakage • Muse Urethral Insert consists of a disposable applicator, small enough to fit into the urethra - the applicator is inserted into the urethra approximately one inch and the prostaglandin E-1 medication is released <p>Infertility</p> <ul style="list-style-type: none"> • sperm count • clinical assessment prior to surgery • assessment of sperm motility • blood test to assess hormone levels <p>Treatment</p> <ul style="list-style-type: none"> • micro-surgical intervention to unblock tubes in the vas deferens or removal of obstruction such as a varicocele • re-connection after vasectomy • vitamin therapy, lose clothing and cold baths • gonadotrophin and chemical treatments (clomid, srephe) to improve sperm motility and production • surgical dilatation treatment for retrograde ejaculation involving the prostatic urethra <p><i>Accept: 'sperm donor' 'IVF' but must be described from male perspective</i></p> <p>Two marks for each description of the main functions, THREE required from</p> <ul style="list-style-type: none"> • Support is provided by the muscles and the skeleton allow the body to have posture and form and to hold organs and body systems in place • Protection is provided by the muscles and the skeleton allowing delicate organs and structures to remain undamaged • Movement is provided by muscles and skeleton in that the muscles contract and relax using various bones as levers and fulcrums and the action of muscles to allow the flow of liquids by peristalsis, contraction and dilation 	[6]

Question Number	Answer	Max Mark
	<ul style="list-style-type: none"> • <i>Candidates may use examples such as the skull protecting the brain etc.</i> • <i>One mark can be given for the example the remaining mark for the description. Or two marks for an appropriate description.</i> • Sub-max of three for identification only. <p>One mark for each description of a function</p> <p>Cerebral hemisphere Receives information from sense organs eg touch, taste Sends messages/controls muscles of the body</p> <p>Cerebellum Co-ordinates muscle movements Fine tunes muscle actions/sequences Helps maintain balance</p> <p>Sensory neuron Carries nerve messages/impulses from sense organ to central nervous system</p> <p>Myelin sheath Speeds up transmission of nerve impulses Makes conduction of impulses more efficient</p> <p>Medulla oblongata Controls breathing Regulates heart action Controls vomiting</p>	[5]
(c)(i)	<p>One mark for musculo-skeletal dysfunction ONE required Two marks for explanation of effects (physiological and / or PIES effects), TWO required from</p> <p>Dysfunctions</p> <ul style="list-style-type: none"> • arthritis, rheumatoid or osteo • osteoporosis • Parkinson's disease • multiple sclerosis 	[5]

Question Number	Answer	Max Mark
	<p>Arthritis</p> <ul style="list-style-type: none"> • inflammation of one or more joints causing redness, swelling, pain and loss of joint mobility • may be caused by wear and tear or may be a symptom of a generalised disease • swelling can be due to fluid collections • osteoarthritis is the gradual destruction of weight bearing joints and sometimes the hands, it cannot be reversed • rheumatoid arthritis affects hands, knees, shoulders, ankles and can produce painless round rheumatoid nodules under the skin • can cause damage to tissue throughout the body unlike osteoarthritis <p>Osteoporosis</p> <ul style="list-style-type: none"> • bones lose their density, worse with age and more common in women, fractures are common in hip wrist and spine with associated nerve damage • the bones lose calcium, phosphate and the matrix breaks down • lack of oestrogen in menopause, factors that attribute and accelerate it are diet, lack of exercise, smoking, excessive alcohol and prolonged bed rest • other effects could include anorexia, thyroid hormone change and corticosteroids <p>Parkinson's</p> <ul style="list-style-type: none"> • disease of the central nervous system giving gradual, progressive muscle tremors, rigidity and clumsiness • a mask like expression awkward, shuffling walk with a stooped posture, slow monotonous voice • walking, talking and tasks become progressively difficult • later stages mental deterioration and dementia occur <p>Multiple sclerosis</p> <ul style="list-style-type: none"> • progressive and debilitating CNS disease involving on going destruction of the myelin sheaths of nerves • this effectively causes short circuits in the system and disrupts signals • therefore all systems can be affected in some way • cause or trigger is said to be viral, auto immune response that T cells target myelin as foreign 	

Question Number	Answer	Max Mark
	<p>One mark for diagnostic technique. One mark for treatment. One - two marks for description of treatment.</p> <p>Arthritis Diagnosis: Plain x-rays, CAT / MRI scanning, blood tests</p> <ul style="list-style-type: none"> • can be exacerbated by acidic diet • treated by NSAID's steroids and surgical intervention eg joint replacement, arthrodesis, injections of gold salts, D-penicillamine and chloroquine <p>Osteoporosis</p> <ul style="list-style-type: none"> • Diagnosis: Bone densitometry, x-ray, CAT scan, blood test. • treatment includes HRT vitamin D and calcium supplements • calcitonin injections may help • preventative lifestyle changes prove most effective when started young <p>Parkinson's Diagnosis: mainly clinical observation</p> <ul style="list-style-type: none"> • treatments include levodopa and carbidopa to decrease tremors and rigidity • surgical grafting of dopamine secreting neurones or surgery to destroy certain nerve pathways (ablation) • use of canaboids to reduce symptoms <p>Multiple Sclerosis</p> <ul style="list-style-type: none"> • Diagnosis: neurological tests, blood test • no cure but various drug treatments are available to suppress symptoms and effects • rest and support until periods of remission <p>General:</p> <ul style="list-style-type: none"> • pain killers • anti-inflammatories • physiotherapy – non-weight-bearing exercises eg swimming • surgery • complementary therapies • alternative diets 	[4]

Question Number	Answer	Max Mark
5*	<p><i>Level 4 [20-25 marks]</i> Candidates will explain two form of physiological effect on the cardio-vascular system and effects on two other body systems (although one may be more detailed than another towards the lower end of this level). They will demonstrate the ability to present their answer in a well-planned and logical manner, with a clearly defined structure. They will use appropriate terminology confidently and accurately. Sentences and paragraphs will directly address the question in a consistent, relevant and well-structured way. There will be few, if any, errors in the use of grammar, punctuation and spelling.</p> <p><i>Level 3 [14-19 marks]</i> Candidates will explain at least one form of physiological effect on the cardio-vascular system and at least two other effects on other body systems, or vice versa. They will demonstrate the ability to present their answer in a planned and logical sequence using appropriate and accurate terminology. Sentences and paragraphs are for the most part relevant and material will be presented in a balanced, logical and coherent manner that addresses the question. There may be occasional errors in the use of grammar, punctuation and spelling.</p> <p><i>Level 2 [8-13 marks]</i> Candidates will describe one effect on the cardio-vascular system and one other effect on another body system. They will demonstrate limited ability to organise their answer, using some appropriate terminology. Sentences and paragraphs will not always be relevant and material will be presented in a way that does not always address the question. There may be noticeable errors of grammar, punctuation and spelling.</p> <p><i>Level 1 [0-7 marks]</i> Candidates will identify / describe one form of general effect on the cardio-vascular system and / or one other effect on another body system. The description will be limited with little evidence of the use of appropriate terminology. Sentences and paragraphs have limited coherence and structure, with little relevance to the main focus of the question. Errors in the use of grammar, punctuation and spelling may be noticeable and obtrusive</p>	[25]

Question Number	Answer	Max Mark
	<p>Physiological effects on:</p> <p>(S1) Cardio-vascular effects</p> <p>Negative:</p> <ul style="list-style-type: none"> • too much caffeine raises blood pressure • obesity, alcohol, high salt levels also raise blood pressure • high blood pressure can result in strokes • high fat diet, especially high in saturated and trans fats, results in high LDL levels • resulting in atheroma which in turn can increase chance of angina, heart attacks and peripheral vascular disease leading to possible amputations and strokes • obesity and high carbohydrate diet increases risk of developing diabetes which in turn will increase atheroma formation; damage to blood vessels supplying nerves, the eye, kidney and limbs. <p>Positive:</p> <ul style="list-style-type: none"> • oily fish/omega 3 oils and soluble NSPs/fibre both reduce LDL levels and promote HDL levels • phytochemicals in fruit and vegetables, for example garlic, onion, green tea act as anti-oxidants as does vitamin C. Lycopene from tomatoes; flavonoids from red wine all act as anti-oxidants or reduce LDL levels • vitamin B6 reduces levels of homocysteine which increases atheroma • vitamin B12 is needed for formation of red blood cells as is folic acid especially during pregnancy • vitamins C and E both stimulate the immune system • the mineral selenium is also beneficial to the heart • mineral iron needed for haemoglobin in red blood cells. <p>(S2) Digestive effects</p> <p>Negative:</p> <ul style="list-style-type: none"> • too much caffeine from coffee or cola drinks can help cause ulcers • food intolerances such as to wheat and dairy products can contribute to IBS • a diet high in fats and cholesterol can increase chance of gallstones. <p>Positive:</p> <ul style="list-style-type: none"> • increased level of fibre can avoid constipation and reduce likelihood of developing diverticulitis • possible link between a high fibre diet and reduced risk of bowel cancer • high fibre diet also slows down sugar absorption and also is known to help reduce the symptoms of IBS. 	

Question Number	Answer	Max Mark
	<p>(S3) Renal effects Negative:</p> <ul style="list-style-type: none"> • high carbohydrate and fat diet increases risk of diabetes which in turn leads to kidney disease and possible failure • high protein diet can lead to kidney damage • there are links between high consumption of dairy products and kidney disease • a diet with an excess of rhubarb, spinach and asparagus can increase chance of forming kidney stones as can not drinking sufficient water. <p>Positive:</p> <ul style="list-style-type: none"> • drinking plenty of water. <p>(S4) Reproductive effects Negative:</p> <ul style="list-style-type: none"> • obesity is a major factor in contributing to female infertility • alcohol reduces male fertility <p>Positive:</p> <ul style="list-style-type: none"> • diet rich in zinc and vitamin E aids fertility <p>(S5) Respiratory effects</p> <ul style="list-style-type: none"> • some foods such as milk, eggs, wheat and nuts can trigger asthma attacks. <p>(S6) Musculo-skeletal effects Negative:</p> <ul style="list-style-type: none"> • obesity increases problems of arthritis • high protein diet speeds up bone removal leading to osteoporosis • high intake of cola drinks helps accelerate bone removal • alcohol also reduces bone. <p>Positive:</p> <ul style="list-style-type: none"> • diet with good levels of calcium, phosphorus and vitamin D will aid bone formation. <p>Any other valid answers</p>	
	Paper Total	[100]

Assessment Objectives Grid (includes QWC)

Question	AO1	AO2	AO3	AO4	Total
1(a)	7				7
1(b)		4		4	8
2(a)	1	5		4	10
2(b)	1		4	5	10
3(a)	5				5
3(b)	1	1	5		7
3(c)			4	4	8
4(a)	3		3		6
4(b)		1	4		5
4(c)	1	2		2	5
4(d)	1			3	4
5	3	7	10	5	25
Totals	23	20	30	27	100
Target	20	20	30	30	100