SCQF level 6
Unit Specification

hHuman Biology: Physiology and Health

SCQF: level 6 (6 SCQF credit points)

Unit code: J20J 76

Unit outline

The general aim of this Unit is to develop skills of scientific inquiry, investigation and analytical thinking, along with knowledge and understanding of physiology and health. Learners will apply these skills when considering the applications of physiology and health on our lives. This can be done by using a variety of approaches, including investigation and problem solving.

The Unit covers the key areas of:
the structure and function of reproductive organs and gametes and their role in fertilisation; hormonal control of reproduction; the biology of controlling fertility; ante- and postnatal screening; the structure and function of arteries, capillaries and veins; the structure and function of the heart; pathology of cardio vascular disease (CVD); blood glucose levels and obesity.

Learners will research issues, apply scientific skills and communicate information related to their findings, which will develop skills of scientific literacy.

Learners who complete this Unit will be able to:

1 Apply skills of scientific inquiry and draw on knowledge and understanding of the key areas of this Unit to carry out an experiment/practical investigation
2 Draw on knowledge and understanding of the key areas of this Unit and apply scientific skills

This Unit is available as a free-standing Unit. The *Unit Support Notes* provide advice and guidance on delivery, assessment approaches and development of skills for learning, skills for life and skills for work. Exemplification of the standards in this Unit is given in Unit Assessment Support.

Recommended entry

Entry to this Unit is at the discretion of the centre. However, learners would normally be expected to have attained the skills, knowledge and understanding required by one or more of the following or equivalent qualifications and/or experience:

- National 5 Biology Course or relevant component Units

Equality and inclusion

This Unit Specification has been designed to ensure that there are no unnecessary barriers to learning or assessment. The individual needs of learners should be taken into account when planning learning experiences, selecting assessment methods or considering alternative evidence. For further information, please refer to the Appendix: *Unit Support Notes.*

Standards

Outcomes and Assessment Standards

Outcome 1

The learner will:

1 Apply skills of scientific inquiry and draw on knowledge and understanding of the key areas of this Unit to carry out an experiment/practical investigation by:

1.1 Planning an experiment/practical investigation
1.2 Following procedures safely
1.3 Making and recording observations/measurements correctly
1.4 Presenting results in an appropriate format
1.5 Drawing valid conclusions
1.6 Evaluating experimental procedures

Outcome 2

The learner will:

2 Draw on knowledge and understanding of the key areas of this Unit and apply scientific skills by:

2.1 Making accurate statements
2.2 Solving problems

Evidence Requirements for the Unit

Assessors should use their professional judgement, subject knowledge and experience, and understanding of their learners, to determine the most appropriate ways to generate evidence and the conditions and contexts in which they are used.

The key areas covered in this Unit are:
the structure and function of reproductive organs and gametes and their role in fertilisation; hormonal control of reproduction; the biology of controlling fertility; ante- and postnatal screening; the structure and function of arteries, capillaries and veins; the structure and function of the heart; pathology of cardio vascular disease (CVD); blood glucose levels and obesity.

Evidence can be drawn from a variety of sources and presented in a variety of formats.

The following table describes the evidence for the assessment standards which require exemplification. Evidence may be presented for individual outcomes, or gathered for the unit. If the latter approach is used, it must be clear how the evidence covers each outcome.

Assessment Standard	**Evidence required**
Planning an experiment	The plan should include: ♦ a clear statement of the aim ♦ a hypothesis ♦ a dependent and independent variable ♦ variables to be kept constant ♦ measurements/observations to be made ♦ the equipment/materials ♦ a clear and detailed description of how the experiment/practical investigation should be carried out, including safety considerations
Presenting results in an appropriate format	One format from: table, line graph, chart, key, diagram, flow chart, summary, extended text or other appropriate format
Drawing a valid conclusion	Include reference to the aim
Evaluating experimental procedures	Suggest two improvements with justification
Making accurate statements	At least half of the statements should be correct across the key areas of this Unit
Solving problems	One of each: ♦ make generalisations/predictions ♦ select information ♦ process information, including calculations, as appropriate ♦ analyse information

Exemplification of assessment is provided in Unit assessment support packs.
Advice and guidance on possible approaches to assessment is provided in the Appendix: *Unit Support Notes.*

Assessment Standard Thresholds

Outcome 1

Candidates are not required to show full mastery of the assessment standards to achieve Outcome 1. Instead, five out of the six assessment standards for Outcome 1 must be met to achieve a pass. Candidates must be given the opportunity to meet all assessment standards. The threshold has been put in place to reduce the volume of re-assessment where that is required.

Transfer of evidence
Evidence of Outcome 1 in a unit is transferrable between the other units at SCQF level 6.

Re-assessment
Candidates can be given the opportunity to re-draft their original Outcome 1 report or to carry out a new experiment/practical investigation.

Outcome 2

There is no requirement to pass assessment standard 2.1 (making accurate statements) and assessment standard 2.2 (solving problems) independently. Candidates can be assessed using a single test that contains marks and a cut-off score.
A suitable unit assessment will cover all of the key areas (assessment standard 2.1) **and** assess each of the problem-solving skills (assessment standard 2.2).

Where a candidate achieves 50% or more of the total marks available in a single unit assessment, they will pass Outcome 2 for that unit. Existing unit assessment support packs (UASPs) can be used, or centres can replace the questions with suitable alternatives of a similar standard

Unit assessment support pack 1 contains questions on all of the key areas (AS 2.1) and questions covering each of the problem solving skills (AS 2.2), and may be adapted for use as a single assessment. The number of marks available for each question should be combined to give the total number of marks available. A cut-off score of 50% should be applied to the unit assessments.

Outcome 2: assessment activity 2 – tests contain questions covering assessment standards 2.1 and 2.2 in a single assessment. These do not require to be adapted.

Important note: Centres can continue to assess AS 2.1 and 2.2 separately using the existing UASPs. If this option is chosen, 50% or more of the KU statements (AS 2.1) made by candidates must be correct in the unit assessment and at least one correct response for each problem solving skill (AS 2.2) is required to pass outcome 2. However, if a candidate is given more than one opportunity in a unit assessment to provide a response for a problem solving skill, then they must answer 50% or more correctly.

Re-assessment

SQA's guidance on re-assessment is that there should only be one or, in exceptional circumstances, two re-assessment opportunities. Re-assessment should be carried out under the same conditions as the original assessment. It is at the teacher or lecturer's discretion how they re-assess their candidates. Candidates may be given a full re-assessment opportunity, or be re-assessed on individual key areas and/or problem-solving skills. As there is no requirement to pass assessment standard 2.1 (making accurate statements) and assessment standard 2.2 (solving problems) independently, candidates must achieve 50% of the marks available in the re-assessment.

Development of skills for learning, skills for life and skills for work

It is expected that learners will develop broad, generic skills through this Unit. The skills that learners will be expected to improve on and develop through the Unit are based on SQA's *Skills Framework: Skills for Learning, Skills for Life and Skills for Work* and drawn from the main skills areas listed below. These must be built into the Unit where there are appropriate opportunities.

1 Literacy

1.2 Writing

2 Numeracy

2.1 Number processes
2.2 Money, time and measurement
2.3 Information handling

5 Thinking skills

5.3 Applying
5.4 Analysing and evaluating
5.5 Creating

Amplification of these is given in SQA's *Skills Framework: Skills for Learning, Skills for Life and Skills for Work*. The level of these skills should be at the same SCQF level of the Unit and be consistent with the SCQF level descriptor. Further information on building in skills for learning, skills for life and skills for work is given in the Appendix: *Unit Support Notes.*

Appendix: Unit support notes

Introduction

These support notes are not mandatory. They provide advice and guidance on approaches to delivering and assessing this Unit. They are intended for teachers and lecturers who are delivering this Unit. They should be read in conjunction with:

- the *Unit Assessment Support packs*

Developing skills, knowledge and understanding

Teachers and lecturers are free to select the skills, knowledge, understanding and contexts which are most appropriate for delivery in their centres.

Approaches to learning and teaching

key areas	Suggested learning activities	Exemplification of key areas
1 The structure and function of reproductive organs and gametes and their role in fertilisation (a) Gamete production in the testes. The roles of seminiferous tubules, interstitial cells, testosterone, prostate gland and seminal vesicles. (b) Gamete production in the ovaries to include maturation of ova and the development of a follicle. (c) Site of fertilisation in the oviduct and zygote formation.		Gametes are produced from germline cells. Testes produce sperm in the seminiferous tubules and testosterone in the interstitial cells. The prostate gland and seminal vesicles secrete fluids that maintain the mobility and viability of the sperm. The ovaries contain immature ova in various stages of development. Each ovum is surrounded by a follicle that protects the developing ovum and secretes hormones. Mature ova are released into the oviduct where they may be fertilised by sperm to form a zygote.
2 Hormonal control of reproduction (a) Hormonal onset of puberty. Pituitary gland is stimulated to release follicle stimulating hormone (FSH),luteinising hormone (LH) or interstitial cell stimulating hormone (ICSH) by a releaser hormone produced in the hypothalamus (b) Hormonal control of sperm production. FSH promotes sperm production and ICSH		Hormones control the onset of puberty, sperm production and the menstrual cycle.

key areas	Suggested learning activities	Exemplification of key areas
stimulates the production of testosterone. Testosterone also stimulates sperm production and activates the prostate gland and seminal vesicles. Negative feedback control of testosterone by FSH and ICSH.		
(c) Hormonal control of the menstrual cycle. Development of a follicle and the endometrium in the uterus. Roles of FSH, LH, oestrogen and progesterone in the menstrual cycle. Development of a follicle, the corpus luteum and the endometrium. Follicular and luteal phases. Blastocyst implantation. Negative feedback control through pituitary gland, FSH and progesterone, leading to menstruation.	Construct charts to illustrate the changes in the female body during the menstrual cycle. Identify the fertile period from data on timing of menstruation, body temperature, cervical mucus and life span of sperm and egg.	The menstrual cycle takes approximately 28 days with the first day of menstruation regarded as day one of the cycle. FSH stimulates the development of a follicle and the production of oestrogen by the follicle in the follicular phase. Oestrogen stimulates proliferation of the endometrium preparing it for implantation and affects the consistency of cervical mucus making it more easily penetrated by sperm. Peak levels of oestrogen stimulate a surge in the secretion of LH which triggers ovulation. In the luteal phase the follicle develops into a corpus luteum and secretes progesterone. Progesterone promotes further development and vascularisation of the endometrium preparing it to receive a blastocyst if fertilisation occurs. The negative feedback effect of the ovarian hormones on the pituitary gland and the secretion of FSH and LH prevent further follicles from developing. The lack of LH leads to degeneration of the corpus luteum with a subsequent drop in

key areas	Suggested learning activities	Exemplification of key areas
		progesterone levels leading to menstruation.
3 The biology of controlling fertility (a) Infertility treatments and contraception are based on the biology of fertility. Risks and ethics associated with fertility treatments.		
(b) Fertile periods. Cyclical fertility in females leading to a fertile period. Continuous fertility in males. Calculation of fertile periods and their use.	Case studies on infertility, its causes and treatment to include overcoming problems in sperm production and ovulation, predicting fertile periods, and surgical interventions.	
(c) Treatments for infertility. Stimulating ovulation. Ovulation stimulated by drugs that prevent the negative feedback effect of oestrogen on FSH secretion. Other ovulatory drugs mimic the action of FSH and LH. These drugs can cause super ovulation that can result in multiple births or be used to collect ova for in vitro fertilisation (IVF) programmes. Artificial insemination. Several samples of semen are collected over a period of time. Artificial insemination is particularly useful where the male has a low sperm count. If a partner is sterile a donor may be used.		

key areas	Suggested learning activities	Exemplification of key areas
Intra-cytoplasmic sperm injection (ICSI). If mature sperm are defective or very low in number ICSI can be used — the head of the sperm is drawn into a needle and injected directly into the egg to achieve fertilisation.		
In vitro fertilisation (IVF). Surgical removal of eggs from ovaries after hormone stimulation. Incubation of zygotes and uterine implantation. Pre-implantation genetic diagnosis (PGD). The use of IVF in conjunction with PGD to identify single gene disorders and chromosomal abnormalities.	Examine data on the success rate for *in vitro* fertilisation (IVF) and its effect on long-term health.	The eggs are mixed with sperm in a culture dish. The fertilised eggs are incubated until they have formed at least eight cells and are then transferred to the uterus for implantation.
(d) Contraception — physical and chemical methods of contraception. Biological basis of physical methods. Chemical contraceptives are based on combinations of synthetic hormones that mimic negative feedback preventing the release of FSH/LH.	Case studies on the biological basis of physical and chemical contraceptives.	Physical methods such as barrier methods, avoiding fertile periods, intra uterine devices and sterilisation procedures. Some prevent implantation ('morning-after pills') or cause thickening of cervical mucus ('progesterone-only pill').
4 Ante- and postnatal screening		
(a) Antenatal screening identifies the risk of a disorder so that further tests and a prenatal diagnosis can be offered.	Case study on antenatal care to include the use of ultrasound images and biochemical tests.	A variety of techniques can be used to monitor the health of the mother and developing fetus.
Ultrasound imaging.	View ultrasound images at different stages	Measuring a substance at the wrong time

key areas	Suggested learning activities	Exemplification of key areas
Anomaly scans may detect serious physical problems. Dating scans, for pregnancy stage and due date, are used with tests for marker chemicals which vary normally during pregnancy.	of pregnancy. View specialised ultrasound images.	could lead to a false positive result.
Biochemical tests to detect the normal physiological changes of pregnancy.	Examine data on altered blood biochemistry due to altered renal, liver and thyroid function; alterations to carbohydrate and calcium metabolism; and hormonal changes.	Blood pressure, blood type and general health checks (including routine blood and urine tests).
Diagnostic testing Amniocentesis and chorionic villus sampling (CVS) and the advantages and disadvantages of their use. Cells from samples can be cultured to obtain sufficient cells to produce a karyotype to diagnose a range of conditions.	Examine data on the risks associated with testing for Down's syndrome. Blood test for alpha-fetoprotein (AFP) and subsequent test for the 'marker' nuchal translucency by ultrasound. If the results indicate a high risk of Down's syndrome further diagnostic tests with more risk may be offered. Construct karyotypes of fetal material which indicate a variety of genetic disorders. Suitable examples include: Down's trisomy, Edwards trisomy, Klinefelter's/Turner's syndromes, Familial Down's, Fragile X, Cri-du-chat.	Medical conditions can be detected by a range of marker chemicals that indicate a condition but need not necessarily be part of the condition. As a result of routine screening or for individuals in high risk categories, further tests may be offered. In deciding to proceed with these tests, the element of risk will be assessed as will the decisions the individuals concerned are likely to make if a test is positive. Tests may include amniocentesis and CVS from the placenta. CVS can be carried out earlier in pregnancy than amniocentesis. Although it has a higher risk of miscarriage CVS karyotyping can be performed on the fetal cells immediately.

key areas	Suggested learning activities	Exemplification of key areas
Rhesus antibody testing. Anti-rhesus antibodies are given to rhesus-negative mothers after a sensitising event or after birth (b) Postnatal screening. Individuals with high levels of phenylalanine are placed on a restricted diet. Diagnostic testing for metabolic disorders, including phenylketonuria (PKU), an inborn error of metabolism. The use of pedigree charts to analyse patterns of inheritance in genetic screening and counselling. Patterns of inheritance in autosomal recessive, autosomal dominant, incomplete dominance and sex-linked recessive single gene disorders. .	New-born screening for other diseases such as galactosaemia, congenital hypothyroidism, amino acid disorders. Examine case studies of inherited conditions including single gene disorders, chromosome abnormalities and conditions influenced by multiple genes. Calculate probability of outcomes in single gene inherited conditions. Suitable examples include: albinism, Huntington's chorea, sickle cell, thalassaemia, haemophilia, muscular dystrophy. Consider moral/ethical issues surrounding PGD.	Generally mothers show no immune response to their fetus although sensitisation to Rhesus antigens can occur. Draw, analyse and interpret pedigree charts over three generations to follow patterns of inheritance in genetic disorders using standardised human pedigree nomenclature and symbols (sex, matings, siblings, affected individuals, twins, heterozygotes, carrier of sex-linked allele and deceased).
5 The structure and function of arteries, capillaries and veins	Study the circulation of the blood through the body including the coronary arteries,	Blood circulates from the heart through the arteries to the capillaries to the veins and

key areas	Suggested learning activities	Exemplification of key areas
	carotid artery, jugular vein, hepatic artery, hepatic vein, hepatic portal vein, renal artery and renal vein.	back to the heart. Decrease in blood pressure as blood moves away from the heart.
(a) The structure and function of arteries, capillaries and veins to include endothelium, central lumen, connective tissue, elastic fibres, smooth muscle and valves. The role of vasoconstriction and vasodilation in controlling blood flow.	Examine prepared slides of arteries and veins. Measure the degree of stretching in arteries and veins with weights. Observe capillaries eg nail bed. Demonstrate the presence of valves in veins.	The endothelium lining the central lumen of blood vessels is surrounded by layers of tissue. Arteries have an outer layer of connective tissue containing elastic fibres and a middle layer containing smooth muscle with more elastic fibres. The elastic walls of the arteries stretch and recoil to accommodate the surge of blood after each contraction of the heart. The smooth muscle can contract or relax causing vasoconstriction or vasodilation to control blood flow. Capillaries allow exchange of substances with tissues. Veins have an outer layer of connective tissue containing elastic fibres but a much thinner muscular wall than arteries. Function of valves.
(b) The exchange of materials between tissue fluid and cells through pressure filtration and the role of lymph vessels. Similarity of tissue fluid and blood plasma with the exception of plasma proteins.	Case study on disorders of the lymphatic system. Suitable examples include the effect of kwashiorkor on fluid balance and elephantiasis.	Pressure filtration of fluids through capillary walls. Tissue fluid supplies cells with glucose, oxygen and other substances. Carbon dioxide and other metabolic wastes diffuse out of the cells and into the tissue

key areas	Suggested learning activities	Exemplification of key areas
		fluid to be excreted. Much of the tissue fluid returns to the blood. Lymphatic vessels absorb excess tissue fluid and return the lymph fluid to the circulatory system.
6 The structure and function of the heart (a) Cardiac function and cardiac output. Definition of cardiac output and its calculation.	Measuring pulse rate in arteries using pulsometer. Calculate cardiac output under different conditions.	The volume of blood pumped through each ventricle per minute is the cardiac output. Cardiac output is determined by heart rate and stroke volume (CO = HR x SV). The left and right ventricles pump the same volume of blood through the aorta and pulmonary artery.
(b) The cardiac cycle to include the functions atrial systole, ventricular systole, diastole. Effect of pressure changes on atrio-ventricular (AV) and semi lunar (SL) valves. Blood flow through the heart and its associated blood vessel	Interpret graphs of pressure changes in heart and blood vessels.	During diastole blood returning to the atria flows into the ventricles. Atrial systole transfers the remainder of the blood through the atrio-ventricular (AV) valves to the ventricles. Ventricular systole closes the AV valves and pumps the blood out through the semi lunar (SL) valves to the aorta and pulmonary artery. In diastole the higher pressure in the arteries closes the SL valves. The opening and closing of the AV and SL valves are responsible for the heart sounds heard with a stethoscope.
	Use a stethoscope or listen to a recording of heart sounds.	The heart beat originates in the heart itself but is regulated by both nervous and

key areas	Suggested learning activities	Exemplification of key areas
(c) The structure and function of cardiac conducting system including nervous control. Control of contraction and timing by cells of the sino-atrial node (SAN) and transmission to the atrio-ventricular node (AVN). Location of the SAN and AVN in the heart. Interpretation of electrocardiograms (ECG). The medulla regulates the rate of the SAN through the antagonistic action of the autonomic nervous system (ANS). Sympathetic accelerator nerves release nor-adrenaline (nor-epinephrine) and slowing parasympathetic nerves release acetylcholine.	Examine normal and abnormal ECGs.	hormonal control. The auto-rhythmic cells of the sino-atrial node (SAN) or pacemaker set the rate at which cardiac muscle cells contract. The timing of cardiac cells contracting is controlled by the impulse from the SAN spreading through the atria and then travelling to the atrio-ventricular node (AVN) and then through the ventricles. These impulses generate currents that can be detected by an electrocardiogram (ECG).
(d) Blood pressure changes, in response to cardiac cycle, and its measurement. Blood pressure changes in the aorta during the cardiac cycle. Measurement of blood pressure using a sphygmomanometer. A typical reading for a young adult is 120/70 mmHg. Hypertension is a major risk factor for many diseases including coronary heart disease.	Measure blood pressure using a digital sphygmomanometer.	An inflatable cuff stops blood flow and deflates gradually. The blood starts to flow (detected by a pulse) at systolic pressure. The blood flows freely through the artery (and a pulse is not detected) at diastolic pressure.
7 Pathology of cardio vascular disease (CVD)		
(a) Process of atherosclerosis, its effect on arteries and blood pressure and its link to	Examine league tables for coronary heart disease worldwide.	Atherosclerosis is the accumulation of fatty material (consisting mainly of cholesterol),

key areas	Suggested learning activities	Exemplification of key areas
cardiovascular diseases (CVD).	Examine trends in coronary heart disease over last 10 years.	fibrous material and calcium forming an atheroma or plaque beneath the endothelium. As the atheroma grows the artery thickens and loses its elasticity. The diameter of the artery becomes reduced and blood flow becomes restricted resulting in increased blood pressure. Atherosclerosis is the root cause of various cardio vascular diseases including angina, heart attack, stroke and peripheral vascular disease.
(b) Thrombosis— Events leading to a myocardial infarction (MI) or stroke. Endothelium damage, clotting factors and the role of prothrombin, thrombin, fibrinogen and fibrin. Thrombus formation and formation and effects of an embolus.	Investigate the use of thrombolytic medications such as streptokinase and tissue plasminogen activator. Compare and contrast the use of antiplatelet and anticoagulants therapies. Investigate examples of bleeding disorders such as Von Willebrand disease and haemophilia A, B and C.	Atheromas may rupture damaging the endothelium. The damage releases clotting factors that activate a cascade of reactions resulting in the conversion of the enzyme prothrombin to its active form thrombin. Thrombin then causes molecules of the plasma protein fibrinogen to form threads of fibrin. The fibrin threads form a meshwork that clots the blood, seals the wound and provides a scaffold for the formation of scar tissue. The formation of a clot (thrombus) is referred to as thrombosis. In some cases a thrombus may break loose forming an embolus and travel through the bloodstream until it blocks a blood vessel. A thrombosis in a coronary artery may lead to a heart attack (MI). A thrombosis in an

key areas	Suggested learning activities	Exemplification of key areas
		artery in the brain may lead to a stroke. Cells are deprived of oxygen leading to death of the tissues
(c) Causes of peripheral vascular disorders including narrowing of arteries due to atherosclerosis, deep vein thrombosis (DVT) and pulmonary embolism due to blood clots.		Peripheral vascular disease is narrowing of the arteries due to atherosclerosis of arteries other than those of the heart or brain. The arteries to the legs are most commonly affected. Pain is experienced in the leg muscles due to a limited supply of oxygen. A DVT is a blood clot that forms in a deep vein most commonly in the leg, and can break off and result in a pulmonary embolism.
(d) Control of cholesterol levels and familial hypercholesterolaemia. Cholesterol synthesis and its function in the cell membrane and in steroid synthesis. Roles of high density lipoproteins (HDL) and low density lipoproteins (LDL). LDL receptors, negative feedback control and atheroma formation. Ratios of HDL to LDL in maintaining health, the benefits of physical activity and a low fat diet. Reducing blood cholesterol through prescribed medications.		Cholesterol is synthesised by all cells, although 25% of total production takes place in the liver. A diet high in saturated fats or cholesterol causes an increase in cholesterol levels in the blood. Cholesterol is a component of cell membranes and a precursor for steroid synthesis. HDL transports excess cholesterol from the body cells to the liver for elimination. This prevents accumulation of cholesterol in the blood. LDL transports cholesterol to body cells. Most cells have LDL receptors that take LDL into the cell where it releases cholesterol. Once a cell has sufficient

key areas	Suggested learning activities	Exemplification of key areas
		cholesterol a negative feedback system inhibits the synthesis of new LDL receptors and LDL circulates in the blood where it may deposit cholesterol in the arteries forming atheromas. A higher ratio of HDL to LDL will result in lower blood cholesterol and a reduced chance of atherosclerosis.
	Research data on the action of cholesterol reducing drugs. Investigate current views on the use of statins in treatment of patients at risk of CVD.	Regular physical activity tends to raise HDL levels, dietary changes aim to reduce the levels of total fat in the diet and to replace saturated with unsaturated fats. Drugs such as statins reduce blood cholesterol by inhibiting the synthesis of cholesterol by liver cells.
Genetic screening of familial hypercholesterolaemia (FH) and its treatments.	Pedigree analysis of FH. Investigate treatments for FH.	Familial hypercholesterolaemia (FH) due to an autosomal dominant gene predisposes individuals to developing high levels of cholesterol. FH genes cause a reduction in the number of LDL receptors or an altered receptor structure. Genetic testing can determine if the FH gene has been inherited and it can be treated with lifestyle modification and drugs.
8 Blood glucose levels and obesity (a) Chronic elevated blood glucose levels leads to atherosclerosis and blood vessel	Investigate the symptoms associated with 'microvascular disease' and	Chronic elevation of blood glucose levels leads to the endothelium cells taking in

key areas	Suggested learning activities	Exemplification of key areas
damage.	'macrovascular'.	more glucose than normal damaging the blood vessels. Atherosclerosis may develop leading to cardio vascular disease, stroke or peripheral vascular disease. Small blood vessels damaged by elevated glucose levels may result in haemorrhage of blood vessels in the retina, renal failure or peripheral nerve dysfunction.
Pancreatic receptors and the role of hormones in negative feedback control of blood glucose through insulin, glucagon and adrenaline (epinephrine).		Pancreatic receptors respond to high blood glucose levels by causing secretion of insulin. Insulin activates the conversion of glucose to glycogen in the liver decreasing blood glucose concentration. Pancreatic receptors respond to low blood glucose levels by producing glucagon. Glucagon activates the conversion of glycogen to glucose in the liver increasing blood glucose level. During exercise and fight or flight responses glucose levels are raised by adrenaline (epinephrine) released from the adrenal glands stimulating glucagon secretion and inhibiting insulin secretion.
Diagnosis, treatments and role of insulin in type 1 and type 2 diabetes.	Analyse glucose tolerance curves of normal and diabetic subjects.	Vascular disease can be a chronic complication of diabetes. Type 1 diabetes usually occurs in childhood. Type 2 diabetes or adult onset diabetes typically develops later in life and occurs mainly in overweight

key areas	Suggested learning activities	Exemplification of key areas
		individuals. A person with type 1 diabetes is unable to produce insulin and can be treated with regular doses of insulin. In type 2 diabetes individuals produce insulin but their cells are less sensitive to it. This insulin resistance is linked to a decrease in the number of insulin receptors in the liver leading to a failure to convert glucose to glycogen. In both types of diabetes individual blood glucose levels will rise rapidly after a meal and the kidneys are unable to cope resulting in glucose being lost in the urine. Testing urine for glucose is often used as an indicator of diabetes. The glucose tolerance test is used to diagnose diabetes. The blood glucose levels of the individual are measured after fasting and two hours after drinking 250–300 ml of glucose solution.
(b) Obesity linked to cardiovascular disease and diabetes. Definition and characterisation of obesity. Body fat, body density measurements and BMI calculations. Role of exercise and diet in reducing obesity and CVD.	Compare measurement of body composition using different methods. For example using densitometry, skin fold thicknesses, bioelectrical impedance, waist-hip ratio and body mass index. Perform simple measurements of body composition.	Obesity is a major risk factor for cardiovascular disease and type 2 diabetes. Obesity is characterised by excess body fat in relation to lean body tissue (muscle). A body mass index (weight divided by height squared) greater than 30 is used to indicate obesity. Accurate measurement of body fat requires the measurement of body density.

key areas	Suggested learning activities	Exemplification of key areas
	Analyse data which illustrates the effect of exercise on body composition. Examine case histories using coronary heart disease risk calculators (eg Framingham index). Examine risk factors and remedial measures in treating cardiovascular disease.	Obesity is linked to high fat diets and a decrease in physical activity. The energy intake in the diet should limit fats and free sugars as fats have a high calorific value per gram and free sugars require no metabolic energy to be expended in their digestion. Exercise increases energy expenditure and preserves lean tissue. Exercise can help to reduce risk factors for CVD by keeping weight under control, minimising stress, reducing hypertension and improving HDL blood lipid profiles.

Administrative information

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Superclass: RH

History of changes to National Unit Specification

Version	Description of change	Authorised by	Date
2.0	Page 1 – the description of key areas under 'Unit outline' has been revised to give more information Page 4 – in Outcome 1.3, the word 'accurately' has been replaced by 'correctly'. Page 5– the Evidence requirements have been rewritten to better explain what is required Page 5 – information has been added on Transfer of Evidence	Qualifications Development Manager	April 2014
3.0	Assessment Standards 2.2 & 2.3 removed	Qualifications Development Manager	June 2014
4.0	Updated to ensure consistency of wording of Evidence Requirements with Unit outline and in regard to the mandatory key areas.	Qualifications Manager	April 2015
5.0	Level changed from Higher to SCQF level 6. Unit support notes added. Assessment standard threshold added.	Qualifications Manager	September 2018
6.0	Unit code updated	Qualifications Manager	July 2019