AQA GCSE BIOLOGY (HIGHER) · 8461

BIOLOGY



MARK SCHEME

4.2.2 ANIMAL TISSUES, ORGANS AND ORGAN SYSTEMS (PACK 2)

SCORE	PERCENTAGE
/312	%

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Q1.

(a) any **two** from:
- carbon dioxide / CO_2
- urea
- protein
- water / H_2O
- hormones / insulin.

ignore food / waste / alcohol / drugs / enzymes
ignore glucose and oxygen
*allow **two** correct hormones for 2 marks*
*allow **two** correct food components for 2 marks*
allow antibodies
allow antitoxins

2

(b) (i) plasma

1

platelets

1

(ii) (cardiac) muscle
allow muscular

1

(c) Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response. Examiners should also refer to the information in the Marking Guidance and apply a 'best-fit' approach to the marking.

0 marks
No relevant content

Level 1 (1−2 marks)
There is a description of at least one advantage of the cow tissue valve
or
a description of at least one disadvantage of the cow tissue valve.

Level 2 (3−4 marks)
There is a description of at least one advantage of the cow tissue valve
and
at least one disadvantage of the cow tissue valve.

Level 3 (5−6 marks)
There is a description of the advantages and disadvantages of the cow tissue valve
or
a description of several advantages of the cow tissue valve and at least one disadvantage.

Examples of the points made in the response

Advantages of cow tissue valve:

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- abundant supply of cows
- so shorter waiting time

  ignore can take many years to find a suitable human donor
- no need for tissue typing
- quicker operation
- less invasive **or** shorter recovery time
- cheaper operation costs
- less operation / anaesthetic risks.

Disadvantages of cow tissue valve:

- made from cow so possible objections on religious grounds

  ignore ethical arguments
- new procedure so could be unknown risks

  allow possible transfer of disease from cow
- risks of using a stent eg. blood clots, stent breaking or valve tearing
- not proven as a long term treatment
- may be rejected

  ignore information copied directly from the table without value added.

6

[11]

Q2.

(a) (i) has the least amount of glucose

*allow least amount of fat **or** no fat*

1

(to) transfer energy (for the run)

allow (to) release energy (for the run)

*do **not** allow produces energy*

*do **not** allow 'energy for respiration'*

1

(ii) any **one** from:

- cells will work inefficiently
- absorb too much water / swell / overhydrate
- lose too much water / shrink / dehydrate

ignore turgid / flaccid

cells burst is insufficient

allow cramp in muscle.

1

(b) any **three** from:

- thermoregulatory centre
- (has temperature) receptors
- (which) monitor blood temperature (as it flows through the brain)
- (temperature) receptors in the skin
- (receptors) send impulses to the brain

ignore vasoconstriction / vasodilation / sweating

allow hypothalamus

impulses sent to the thermoregulatory centre = 2 marks.

3

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(c) (i) (sports drinks) contain a lot of glucose

1

(a person with diabetes) does not produce insulin **or** does not produce enough insulin

allow (person with diabetes) has cells which do not respond to insulin

*do **not** allow insulin produced by liver*

1

so <u>blood</u> glucose / sugar levels will rise too high **or** to a dangerous level

1

(ii) inject insulin

or

have an insulin pump (fitted)

*do **not** allow swallow insulin*

accept exercise

accept inhale insulin

*accept take metformin **or** other correctly named drug*

allow pancreatic transplant

1

[10]

Q3.

(a) (i) diaphragm

accept phonetic spelling

1

(ii) (because) the volume (inside the jar) increases

*maximum **two** marks if no reference to correct part of model*

1

(causing) the pressure to decrease

1

(and) air enters the balloon

allow oxygen

1

(b) (i) (so it moves by) diffusion

*do **not** allow osmosis or active transport*

1

from a high concentration (of oxygen) to a low concentration

*allow down its / oxygen concentration gradient from the air **or** to the blood*

or

(because) there is a high(er) concentration (of oxygen) in the air **or** there is a low(er) concentration of oxygen in the blood

ignore reference to amount of oxygen

1

(ii) many gill <u>filaments</u>

must be in the correct pairs to gain 2 marks

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1

(give a) large surface / area

*do **not** allow surface area to volume ratio*

or

thin

(so) short diffusion pathway

or

good blood supply

(to) maintain the concentration gradient

or

water continually flows over them / continually ventilated

(to) maintain the concentration gradient

1

[8]

Q4.

(a) (i) diffusion

1

(ii) carbon dioxide

accept CO_2 / CO2

*do **not** accept CO^2*

1

(iii) red blood cells

1

(b) 70

if no / incorrect answer then

70 000 000

or

*280 x 0.25 gains **1** mark*

ignore doubling the answer

2

(c) allows more gas / oxygen / CO_2 (exchange)

*do **not** accept air*

1

[6]

Q5.

(a) any **three** from:

- parts of organisms have not decayed

  accept in amber / resin

  allow bones are preserved
- conditions needed for decay are absent

  accept appropriate examples, eg acidic in bogs / lack of oxygen
- parts of the organism are replaced by other materials as they decay

  accept mineralised

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- or other preserved traces of organisms, eg footprints, burrows and rootlet traces

  allow imprint or marking of organism

3

(b) (i) teeth for biting (prey)

must give structure + explanation

1

claws to grip (prey)

accept sensible uses

1

wing / tail for flight to find (prey)

1

(ii) any **two** from:

- new predators
- new diseases
- better competitors
- catastrophe eg volcanic eruption, meteor
- changes to environment over geological time

  accept climate change

  allow change in weather
- prey dies out **or** lack of food

  allow hunted to extinction

2

[8]

Q6.

(a) (i) sucrose

1

(ii) fructose is sweeter than sucrose

1

can use less fructose (for same sweetness)

1

cheaper / can use in slimming food

allow 'less calories '

accept 'better for diabetics'

1

(b) (i) carbohydrases

1

(ii) denatured / shape changed

ignore 'inactivated'

allow 'enzyme / shape destroyed'

1

(iii) faster reaction

1

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so more product made / product made in shorter time

allow '60 °C will kill microorganisms'

1

(c) any **two** from:

- enzyme can be re-used / not wasted
- constant-flow system
- can be automated
- product (= food) not contaminated by enzyme / enzyme may give allergic reaction / no need to separate P from E

allow 'people do not want to eat enzymes'

2

(d) any **three** from:

- volume is smaller so costs less to heat / to maintain temperature / to build
- temperature is cooler so costs less to heat / to maintain temperature / loses less heat to surroundings
- reaction time is shorter so reduces running costs (re. heating / stirring) or can make more product in time
- 1-stage product refining c.f. 4 stages, leading to reduced labour / time cost

need to qualify each point with respect to how it lowers costs

3

(e) (i) 4500

*correct answer = **2** marks*

*allow **1** mark for: 1500 x 3*

2

(ii) enzyme used for longer / less enzyme needed

1

less money spent <u>on</u> <u>enzyme</u>

1

[17]

Q7.

(a) (i) capillaries

1

(ii) platelets

1

(iii) fibrinogen changes to fibrin

1

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(b)

✓	×	×	✓
×	✓	×	✓
✓	✓	✓	✓
×	×	×	✓

***1** mark per correct row*

or

***1** mark per correct column*

whichever is greater

3

(c) (i) antibody / antigen has specific shape

ignore active site

1

antibody fits antigen / has shape complementary to antigen

1

(ii) group A has anti-B antibodies which bind to B-antigens

1

join / clump RBCs together so too big to pass through capillary / block capillary

1

any **one** consequence: lack of O_2 / food / blood supply to body cells or cells can't respire

ignore 'cells die' / 'person dies' - look for cause

1

[11]

Q8.

(a) (i) stomach

1

(ii) small intestine

1

(b)

	salivary glands	**stomach**	**pancreas**	**small intestine**
amylase	✓	×	✓	✓
lipase	×	×	✓	✓
protease	×	✓	✓	✓

***1** mark per correct row*

or

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*if no correct row max **1** mark for any one correct column*

2

(c) enzyme / protease / pepsin most effective in acid conditions / low pH

accept optimum / correct pH

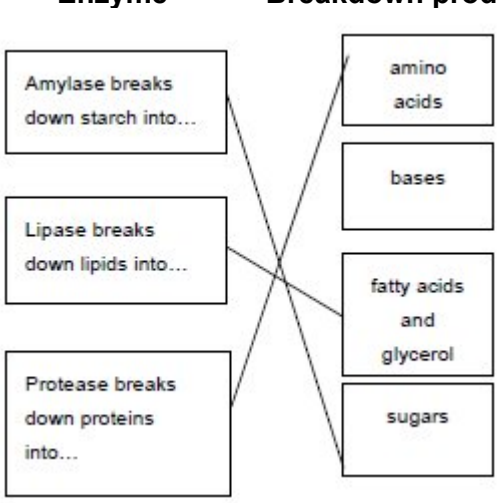
do not accept ref to incorrectly named enzymes

ignore killing bacteria

ignore acid breaks down food

1

(d)



3

[8]

Q9.

(a) (i) muscular

1

(ii) **7**

1

(iii) an electrical device

1

(b) (i) in sequence:

5

1

7

1

2

1

(ii) **3**

1

(c) (i) prevent backflow (of blood) / allow flow in only one direction / in the correct direction

1

(ii) **A**

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*no mark, but max **2** marks if incorrect*

2 / atrium contracts / pressure in **2** increases

1

blood pushes ball (down / towards ventricle / towards **5**)
allow this point even if valve in wrong part of heart

1

(opens valve which) allows blood into **5** / ventricle
***or** converse points re closing the valve*

1

(d) (i) involvement of platelets / eg platelets 'trigger' clotting process / release enzyme(s) / release 'clotting factors'

1

fibrinogen to fibrin
or
meshwork formed (which traps blood cells)

1

(ii) any **four** from:
*to gain **4** marks candidates should include at least:*
***one** advantage and **one** disadvantage*

Advantages

(improved circulation / O_2 supply) provides:

- more cell respiration
- more energy released
- (more) active life / not so tired / more physical activity

Disadvantages

- danger of surgery / operation
- infection from surgery / operation
- valve may need replacing
- clots may form and block blood vessels
  may need to take anti-coagulants – eg warfarin
- clots may cause heart attacks / strokes

4

[17]

Q10.

(a) (Type 2) diabetes / heart disease / deficiency disease / named
allow a relevant health problem
*ignore obesity **or** over / under weight / anorexia*

1

(b) (i) provides more (energy / sugar) than is used
idea of sugar being high in / having a lot of energy eg contains a lot of calories
*allow it is turned to fat **or** stored (as fat)*

1

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(ii) fat

1

(c) (i) C

1

(ii) no health problems

allow as others (may) have (possible) health problems

ignore reference to sweetness

1

(iii) idea of informed choice

eg in case you have health problems / allergies

allow legal requirement

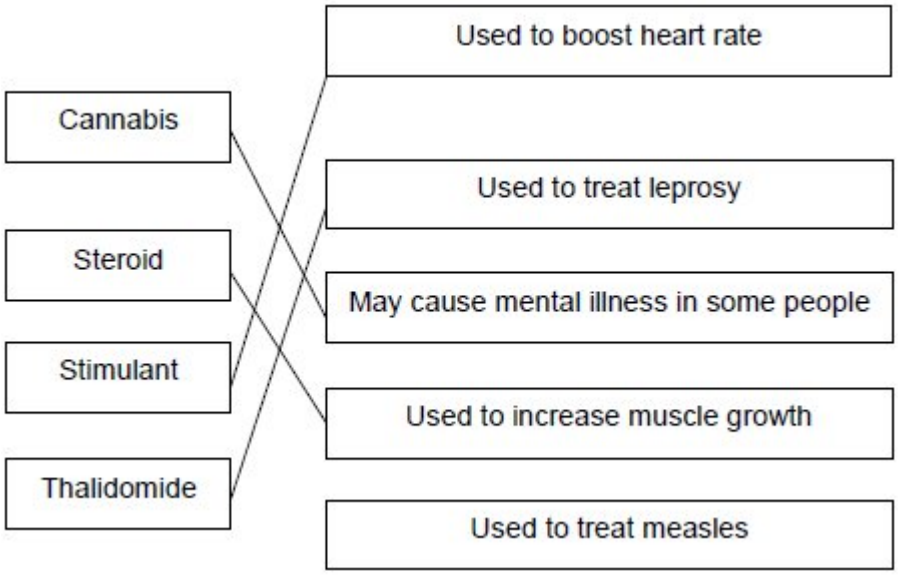
ignore diabetes

1

[6]

Q11.

(a)



extra line from any drug cancels that mark

4

(b) (i) any **one** from:

- (live) animals

  accept named examples, eg mice

  ignore people / volunteers
- cells
- tissues

  *do **not** allow plants*

1

(ii) to check that the drug works

1

to find the best dose to use

1

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(iii) only scientists at the drug company

1

(c) (i) 420

1

(ii) statin(s)

1

(iii) any **one** from:

- side effects
  allow cost
- other medication
  allow patient choice
- other (medical) conditions
  *allow family history **or** age*

1

[11]

Q12.

(a) (i) A = (cell) membrane

1

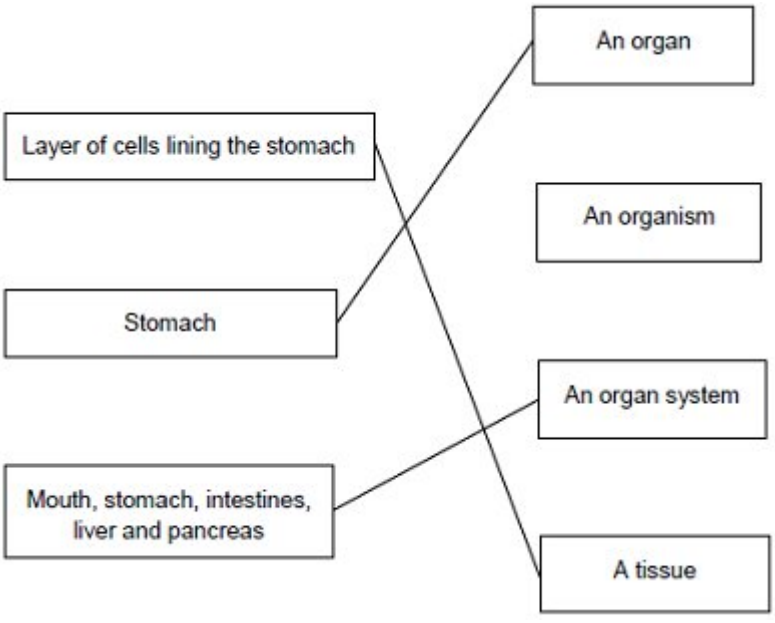
B = cytoplasm
*do **not** accept cytoplast*

1

(ii) To control the activities of the cell

1

(b)



extra lines cancel

3

[6]

Q13.

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(a) (i) amino acid(s)

accept peptide(s)

*do **not** allow polypeptide(s)*

1

(ii) protease

1

(b) (i) 2

1

(ii) repeat

do not allow other enzyme / substrate

1

using smaller pH intervals between pH1 and pH3

allow smaller intervals on both sides of / around pH2

allow smaller intervals on both sides of / around answer to (b)(i)

1

(iii) <u>enzyme / pepsin</u> denatured / shape changed

*do **not** allow enzyme killed*

allow enzyme 'destroyed'

1

<u>enzyme / pepsin</u> no longer fits (substrate)

allow enzyme / pepsin does not work

1

(c) hydrochloric (acid)

allow phonetic spelling

accept HCl

allow HCL

ignore hcl

*do **not** allow incorrect formula –e.g. H_2Cl / HCl_2*

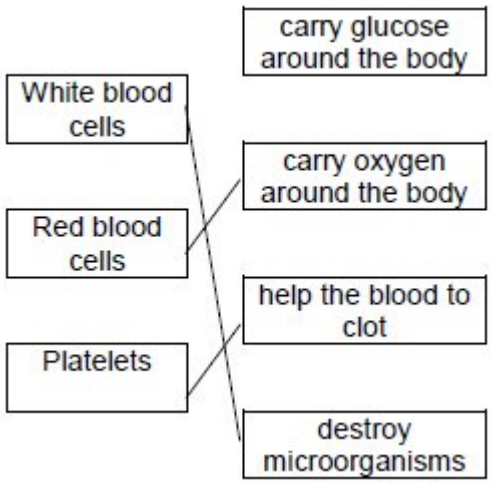
1

[8]

Q14.

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(a) (i)



one mark for each line

extra line negates a mark

3

(ii) any **one** from:

- carbon dioxide / CO_2
- urea

*do **not** allow urine*

ignore water

ignore ions

1

(b) (i) B

1

(ii) D

1

(iii) vein

accept correct named examples

1

(c) (i) any **one** from:

- keeps artery / blood vessel open **or** widens artery / blood vessel
- allows (more) blood to heart / cardiac muscle
- (allows) blood to flow more easily
- allows (more) oxygen to heart / cardiac muscle

1

(ii) any **two** from:

- bleeding

  allow blood clots
- infection
- damaging blood vessels
- damaging the heart
- risk from anaesthetic

2

[10]

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Q15.

(a) (i) defence against **or** destroy pathogens / bacteria / viruses / microorganisms

*do **not** allow 'destroy disease'*
accept engulf pathogen / bacteria / viruses / microorganism
accept phagocytosis
accept produce antibodies / antitoxins
allow immune response

1

(ii) they are small fragments of cells

1

(b) liver

in this order only

1

kidney(s)

1

(c) any **two** from:

- that it doesn't cause an immune response **or** isn't rejected / damaged by white blood cells
- whether it is a long lasting material / doesn't decompose / corrode / inert
- if it is strong (to withstand pressure)
- it will open at the right pressure
- that it doesn't cause clotting
- that it doesn't leak **or** it prevents backflow
- non toxic

ignore correct size

2

[6]

Q16.

A + B most effective (treatment)

ignore descriptions of LDL levels

1

D is (the most) effective (treatment)

D is the best single (treatment)

1

neither A nor B (alone) are effective

allow increase risk of heart disease instead of not effective

1

can't tell if C is effective
OR
A + C is not effective

1

[4]

Q17.

(a) any **two** from:

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or *allow converse for outdoors*

- constant speed
  - *variable speed*
- constant effort
  - *variable terrain*
- constant temperature
  - *traffic conditions*
  - *variable temperature*
  - *wind (resistance)*
  - *rain / snow*

    allow weather

allow pollution only if qualified by effect on body function but ignore pollution unqualified

if no other marks obtained allow variable conditions outdoors

2

(b) Brain

1

(c) (i) 20 800

*correct answer with or without working gains **2** marks*

*if answer incorrect, allow **1** mark for use of 1200 and 22 000 only*

2

(ii) oxygen

apply list principle

1

*do **not** accept other named substances eg CO_2 water*

glucose / sugar

allow glycogen

ignore food / carbohydrate

1

(iii) respire aerobically

1

(iv) carbon dioxide

1

lactic acid

1

(d) increased heart rate

ignore adrenaline / drugs

accept heart beats more but not heart pumps more

1

[11]

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Q18.

(a) (i) directly proportional

gains full marks

or

0.1 rise in rate for 1% rise in concentration

*accept increased concentration: increased rate **or** positive correlation **or** proportional for **1** mark*

2

(ii) 0.6

allow ± 0.01

1

(b) (0.5% trypsin) cheaper

ignore more profit

1

(35°C) faster reaction

allow (35°C) optimum / best temperature

1

so takes less time to make product

1

extra heating cost outweighed by savings on enzyme cost

1

(c) (i) any **two** from:

- breaks down / digests food

  allow pre-digests protein / food
  allow easier for baby to digest

- from protein into amino acids / peptides

- makes soft(er) / runni(er)

  allow description of texture change
  allow make (more) soluble

2

(ii) correct named enzyme

1

correct function

*to gain **2** marks function must relate to correctly named enzyme*

Eg

carbohydrase

accept amylase / maltase / lactase

1

starch → sugar **or** lactose → glucose **or** making sugar syrup

or

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isomerase

glucose → fructose **or** making slimming foods

or

lipase

fats / oils → fatty acids **or** removal of grease stains

accept other correct example

[11]

Q19.

(a) (i) mitochondrion / mitochondria

must be phonetically correct

1

(ii) carbon dioxide / CO_2

1

water / H_2O

1

in either order
*accept CO2 but **not** CO^2*
*accept H2O **or** HOH but not H^2O*

(iii) diffusion

1

high to low concentration

allow down a concentration gradient

1

through (cell) membrane **or** through cytoplasm

*do **not** accept cell wall*

1

(b) ribosomes make proteins / enzymes

1

using amino acids

1

part A / mitochondria provide the energy for the process

allow ATP
*do **not** accept produce or make energy*

1

[9]

Q20.

(a) genes

1

chromosomes

1

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(b) (i) higher yield

1

less use of pesticides

1

(ii) any **two** from:

- uncertain about effects on health
- fewer bees
- might breed with wild plant
- seeds only from one manufacturer

2

[6]

Q21.

(a) pancreas

apply list principle

1

(b) (i) protein

apply list principle

1

(ii) any **one** from:

- (controlling / changing) diet
  accept sugar(y foods) / named eg
  ignore references to starch / fat / protein / fibre
- exercise
  accept example, eg go for a run
- pancreas transplant
  accept named drug eg metformin

1

(c) (i) increase

ignore reference to women

1

then fall

1

relevant data quote (for male)

eg max at ages 65–74 ***or*** *starts at 10 (per thousand)* ***or*** *max at 130 (per thousand)* ***or*** *ends at 120 (per thousand)*

accept a difference between any pairs of numbers in data set

accept quotes from scale eg '130' or '130 per thousand' but ***not*** *'130 thousand'; to within accuracy of +/- 2 (per thousand)*

1

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(ii) (between 0 and 64) more females (than males) **or** less males (than females)

ignore numbers

allow eg females more diabetic than males

1

(over 65) more males (than females) or less females (than males)

allow eg males more diabetic than females

1

[8]

Q22.

(a) (i) any **two** from:

- fibres not damaged
- machines last longer / machines not damaged by stones

*Only **one** from:*

- shorter time or quicker
- lower temperature

uses less energy or cheaper for energy as an alternative to shorter time / lower temperature, if neither of these given

no mark for cheaper unqualified

2

(ii) any **two** from:

- different enzymes (for different dyes)
- enzymes expensive

no mark for expensive alone

- enzymes have to be removed (from denim material) (after washing / treatment)

2

(b) protease

apply list principle

1

[5]

Q23.

(a) **B**

*no mark for "B" alone, the mark is for B **and** the explanation.*

large(r) surface / area **or** large(r) membrane

accept reference to microvilli

ignore villi / hairs / cilia

accept reasonable descriptions of the surface eg folded membrane / surface

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*do **not** accept wall / cell wall*

1

(b) (i) any **one** from:

- (salivary) amylase
- carbohydrase

1

(ii) <u>many</u> ribosomes

*do **not** mix routes. If both routes given award marks for the greater.*

1

ribosomes produce <u>protein</u>

accept amylase / enzyme / carbohydrase is made of protein

or

(allow)

<u>many</u> mitochondria (1)

mitochondria provide energy to build / make <u>protein</u> (1)

accept ATP instead of energy

1

[4]

Q24.

(a) stomach is acidic / has low pH

allow any pH below 7
ignore stomach is not alkaline

1

lactase works best / well in alkali / high pH / neutral / non-acidic conditions

allow any pH of 7 and above
accept works slowly in acid conditions
*allow figures from table with a **comparison***
ignore reference to temperature

1

(b) any **three** from:

- (below 40(°C)) increase in temperature increases rate / speed of reaction
- reference to molecules moving faster / colliding faster / harder / more collisions
- enzyme optimum / works best at 40°C

allow value(s) in range 36 – 44
ignore body temperature unless qualified

- high temperatures (above 40°C) / 45°C / 50°C enzyme denatured

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*allow synonyms for denaturation, but do **not** allow 'killed'*

*denaturation at high <u>and</u> low temperature does **not** gain this mark*

ignore references to time / pH

3

(c) any **two** from:

- acid neutralised or conditions made neutral / alkali

  accept bile is alkaline

- (allow) emulsification / greater surface area (of lipid / fat)

  allow description of emulsification eg fat broken down / broken up <u>into droplets</u>

  *do **not** accept idea of chemical breakdown*

- lipase / enzymes (in small intestine) work more effectively / better

  allow better for enzymes

  ignore reference to other named enzymes

2

[7]

Q25.

(a) (i) capillary

1

(ii) diffusion

1

(b) (i) Z

ignore any names

1

(ii) <u>large</u> / <u>increased</u> surface / area

allow <u>all</u> food absorbed

or to absorb <u>more</u> food
or improved diffusion

1

[4]

Q26.

(a) A

no mark - can be specified in reason part

if B given - no marks throughout

if unspecified + 2 good reasons = 1 mark

high(er) pressure in A

allow opposite for B

*do **not** accept 'zero pressure' for B*

pulse / described in A

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accept fluctuates / 'changes'
allow reference to beats / beating
ignore reference to artery pumping

2

(b) (i) 17

1

(ii) 68
accept correct answer from student's (b)(i) × 4

1

(c) oxygen / oxygenated blood
allow adrenaline
ignore air

glucose / sugar
extra wrong answer cancels - eg sucrose / starch / glycogen / glucagon / water
allow fructose
ignore energy
ignore food

2

[6]

Q27.

(a) (i) A = (cell) wall
ignore cellulose

1

B = cytoplasm

1

(ii) any **one** from:
accept has DNA instead of a nucleus, but not just has DNA

- bacterial cell / it has no nucleus
  allow no mitochondria
- DNA free in cytoplasm
  ignore size
- has no vacuole / no vesicles
  ignore strands of DNA

1

(b) (i) <u>yeast</u> grows best / better / well **or** optimum temperature for <u>yeast</u> / more <u>yeast</u> present
allow <u>yeast</u> works best / better / well

1

(yeast) makes CO_2 **or** respires / respiration
allow fermentation

1

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(ii) bacterium grows best / better / well / more bacteria present **or** optimum temperature for bacterium

ignore microorganisms / microbes

allow works / respires best / better / well

1

(bacterium) makes (lactic) acid

*do **not** allow wrong acid*

1

[7]

Q28.

(a) **A** − saliva(ry) gland

1

B − liver

1

C − duodenum

ignore small intestine

1

D − pancreas

accept phonetic spellings

1

(b) (i) any **three** from:

- chewing / muscle contraction / mechanical digestion

  allow churning
- protease enzymes

  allow pepsin / trypsin
- in stomach / small intestine / duodenum / from pancreas
- (break down protein) into amino acids

  allow (poly)peptides

3

(ii) neutralises acid pH / makes conditions alkaline

1

so lipase can work

1

emulsifies fat

1

to give large(r) surface area for lipase / enzyme action

1

(c) (i) starch

ignore carbohydrate

1

(ii) breakdown stops

allow slows down

1

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because stomach produces / contains acid / has low pH

1

and amylase cannot work in acid / low pH

accept amylase is denatured / changes shape

1

[15]

Q29.

(a) (i) (as a result of) uncontrolled / abnormal growth / division of cells

ignore mutation

allow cells dividing with no contact inhibition

1

(ii) benign tumours do not invade / spread to other tissues / do not form secondary tumours

accept converse for malignant

accept benign tumours do not metastasise

1

(b) via the blood / circulatory system

accept via lymphatic system

1

(c) (i) incidence is increasing

1

more rapidly (over the years)

ignore figures

1

difference between rich and poor areas is getting less

or

the incidence is rising fastest in people from poor areas

accept converse for people from rich areas

1

(ii) risk factor is UV from sunlight

ignore ionising radiation

1

more UK citizens going abroad or taking holidays in the Sun

or

poorer people can afford holidays in the Sun

or

more poorer people are taking holidays in the Sun

1

[8]

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Q30.

(a) (i) **A** lung

1

B rib

1

C diaphragm

1

D alveolus / alveoli

1

(ii) (**B** moves) up(wards) / out / up and out

1

(**C** moves) down(wards) / flattens

*do **not** allow inwards*
ignore outwards
*if neither mark gained allow **1** mark for correct reference to muscle contraction*

1

(b) (i) 1640

1

1440

1

1720

*allow max **1** for 3 correct values using of bottom of piston:*
1380 + 1180 + 1480 to 1485

1

(ii) 1600

*correct answer gains **2** marks*
*if answer incorrect allow **1** mark for evidence of (1640 + 1440 + 1720) ÷ 3*
*allow ecf from **(b)(i)***
allow use of two numbers divided by two if one is considered anomalous:
$\frac{(1640 + 1720)}{2}$ *= 1680*
*for **2** marks*

2

(c) two groups of students − one group sports activity participants, other not

allow students as a group

1

fair test eg groups same height / same mass / same sex

1

measure air breathed in by each student / repeat previous experiment then calculate mean for group

1

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(d) pointer remains still after breathing / cylinder will move down after breathing (in)

1

error reading volume less likely

allow more accurate / reliable

1

(e) (i) operator squeezes bag

1

air forced / pushed into lungs

or

positive pressure ventilator

1

(ii) any **two** from:

- air pressure / volume not regulated
- operator will tire / must be present at all times / variable intervals
- too much / too little air

allow may 'overbreathe' the patient

2

[20]

Q31.

(a) Marks awarded for this answer will be determined by the Quality of Communication (QC) as well as the standard of the scientific response. Examiners should also refer to the information on page 5, and apply a 'best − fit' approach to the marking.

0 marks
No relevant content.

Level 1 (1 − 2 marks)
The method described is weak and could not be used to collect valid results however does show some understanding of the sequence of an investigation.

Level 2 (3 − 4 marks)
The method described could be followed and would enable some results to be collected but lacks detail.

Level 3 (5 − 6 marks)
The method described could be easily followed and would enable valid results to be collected.

examples of biology points made in the response:

- (use of measuring cylinder to) measure equal volumes of detergent solution
- (use of dropping bottle to) apply same number of drops / amount of stain to each piece of cloth
- include stainless cloth as control
- use of forceps to transfer cloths
- use of test tubes as containers for detergent solution + stained cloth
- use water bath to provide a range of temperatures
- cloths left in detergent solution at each temperature

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- for same length of time or measure time taken to remove stain
- repetition
- assessing the stain removal

6

(b) (i) *y* axis: labelled 'Time (taken to remove stain in) minutes' plus suitable scale

data spread greater than half of grid

1

points or bars plotted correctly to within ± 1 mm

*deduct **1** mark for each incorrect plot up to a maximum of 2*

2

one suitable line of best fit drawn on graph

not feathery

not extrapolated to (0,0)

not point to point as on this occasion it is inappropriate

1

(ii) 6 ± 0.1

accept ecf from student graph

1

(c) activity of enzyme still very high / 84% / over 80%
or
only lost 15% / 16% activity

allow above 60 °C marked decrease in activity
allow 85%

1

any **two** from:

- rate of reaction high at 60 °C / higher than at lower temperatures
  allow in terms of reaction kinetics / collisions
- higher temperatures would increase (energy) costs
  or
  might damage cloth
  ignore enzyme denaturation
- higher temperatures / 60 °C is better (than lower temperatures) to remove other stains / named stains

  or
  better for killing bacteria / infection control
  eg grease

2

[14]

Q32.

(a) any **six** from:

- hormone(s) / named produced by pancreas
- if blood glucose levels are too high, insulin is produced / released
- allowing glucose to move from the blood into the cells / named eg liver
- glucose is converted to glycogen

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- if blood glucose levels fall, glucagon is produced / released
- glycogen is converted to glucose
- causing glucose to be released into the blood

6

(b) diabetes that occurs when the body (cells) do not respond / are less responsive to insulin

1

(c) (i) higher BMIs due to <u>increase</u> in mass / weight (relative to height) / obesity

1

obesity / being overweight / being fat is a (significant) <u>risk factor</u> for Type 2 diabetes

allow causes Type 2 diabetes

1

(ii) any **three** from:

- related to <u>described</u> change in diet eg fast foods
- and less exercise
- which increases the chance of obesity / increases BMI
- increased awareness has helped to slow the increase

3

[12]

Q33.

(a) (i) idea of 'normal' food / diet

e.g. 'the same as usual' or 'the same as before'
allow balanced diet
allow none of the slimming programmes
ignore healthy diet

1

(ii) for comparison

accept to show the test is valid
allow to show the effect of the slimming programmes
allow to see if the slimming programmes work
ignore idea of fair test / reliable
*do **not** allow accurate / precise*

1

(b) (i) (at first) large / rapid (loss / change of body mass)

1

then small (loss / change) / levelling off

*accept 'loss of mass decreased' for **2** marks*

1

(ii) all lost body mass (compared to the control group)

1

[5]

Q34.

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(a) (i) rate of chemical reactions (in the body)

1

(ii) any **two** from:

- heredity / inheritance / genetics
- proportion of muscle to fat **or** (body) mass
  allow (body) weight / BMI
- age / growth rate
- gender
  accept hormone balance or environmental temperature
  ignore exercise / activity

2

(b) (i) 77

*correct answer with or without working gains **2** marks*
*allow **1** mark for 70 / 56 **or** 1.25 **or** 5*

2

(ii) increase exercise

accept a way of increasing exercise

1

reduce food intake

accept examples such as eat less fat / sugar
*allow go on a diet **or** take in fewer calories*
ignore lose weight
ignore medical treatments such as gastric band / liposuction

1

[7]

Q35.

(a) (substance / chemical) that affects body chemistry / chemical reactions in the body

1

(b) statin / aspirin / neither recommended

no mark, may be implied. If no recommendation or implication, max 4 marks
answers should be comparative

any **five** from:

- argued evaluation in favour of aspirin or statin or neither

answers could include reference to

*accept converse for statins / aspirin but **not** as advantage of one **and** disadvantage of other*

for statins:

- more people in studies

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- so data / findings more repeatable
  accept reliable for repeatable
  ignore accurate / precise

- reduces cholesterol but aspirin doesn't
  allow reduces cholesterol but no evidence about aspirin

- aspirin (may) causes bleeding / poor clotting but statins do not
  allow aspirin causes bleeding / poor clotting but no evidence about statins

- smaller (total) percentage suffer side-effects

- monitored by doctor, aspirins not

for aspirin:

- cheaper

- can be bought over the counter rather than prescribed

- statins cause serious damage / muscle damage / kidney failure but aspirins do not

similarities:

- both have similar effect on reducing (non-fatal) heart attacks

- incidence of side-effects low in both
  allow (for aspirin) higher reduction of risk of heart attack

5

[6]

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