MARK SCHEME

GCSE

BIOLOGY

AQA - COMBINED SCIENCE

B 2 - TEST 5

Organisation

Advanced

Mark schemes

1.

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]

2.

(a) any **two** from:

- diet

  ignore exercise
  accept any reasonable reference to diet
  *do **not** accept salt / blood pressure*
  ignore age / gender / HDL / LDL

- heredity / genes / genetic makeup

- reference to cholesterol production by liver

2

(b) (i) Blood cholesterol concentration is only one of several factors affecting death from all causes

1

(ii) 170 – 210

accept 210 - 170

1

[4]

3.

pancreas produces lipase
which breaks down / digests fats into fatty acids and glycerol
liver produces bile / hydrogen carbonate
which neutralises acids / makes alkaline
provides optimum / best / most effective pH for lipase / enzyme action
bile emulsifies fats / description
increasing the surface area for lipase / enzyme to act on

any five for 1 mark each

(digestion is in stomach / liver / pancreas – penalise only once)

[5]

4. (a) blood has red (blood) cells / haemoglobin

1

haemoglobin combines with / carries oxygen

ignore 'mix'

***NB** Blood can form oxyhaemoglobin = **2** marks*

1

(b) blood gains oxygen / becomes oxygenated (in the lungs)

idea of acquiring oxygen must be unambiguous

1

blood loses oxygen to the muscles / cells

1

because muscles are respiring (aerobically)

1

to provide energy (for exercise)

1

[6]

5. (a) digested / broken down / made soluble by protease enzyme
in stomach in small intestine / from stomach / from pancreas
into amino acids
amino acids / small molecules absorbed into blood

any four for 1 mark each

4

(b) *ideas that*
lipase / enzyme works best in alkaline / neutral conditions
acid denatures or inactivates enzyme / inhibits enzyme activity
bile emulsifies fat / bile produces larger surface area of fats / bile alkaline
for enzyme to work on / which increase activity of enzymes

any three for 1 mark each

3

[7]

6. (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
  *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]

7. (a) cells can break off
allow cells invade other tissues

1

travel in blood
accept travel in lymph (fluid)

1

(b) $\frac{(89 - 48)}{48} \times 100 = 85.416\dot{6}$

1

85.4 (%)
*allow 85.4 (%) with no working shown for **2** marks)*

1

(c) any **two** from:

- similar survival rates for diagnosis in 1961
- survival rate (for diagnosis in 2011) is 1.5 times greater for prostate cancer compared to bowel cancer
- (survival rates) have improved for both cancers
- (survival rate) for prostate cancer has improved more

*accept survival rate for bowel cancer has increased 2.4 times **but** for prostate cancer 3.4 / 3.36 times*

2

plus **two** from:

- earlier diagnosis
- improved screening programmes
- improved drugs
- difference in level of aggression of cancers
- difference in ease of removing tumours

reason must be correctly linked to comparison

2

[8]

8. (a) blood enters the heart twice on each journey around the body

allow blood circulates once to the lungs (for oxygen) and then around the body

1

(b) **D**

1

(c) **C**

1

(d) coronary artery / arteries

1

(e) right atrium

1

(f) electrical

1

(g) any **two** from:

- rest of diet

allow an example such as fibre or saturated fat or alcohol intake

- weight

allow obesity

- age
- type of activity
- gender
- blood pressure

2

(h)

Level 3: A judgement, strongly linked and logically supported by a sufficient range of correct reasons, is given.	5-6
Level 2: A conclusion, supported by some relevant reasons is given.	3-4
Level 1: Relevant points are made. If there is a conclusion, this is asserted, but not logically linked to the points made.	1-2
No relevant content	0
Indicative content **for** • as hours of activity increase, number of cases of heart disease decrease • increasing hours of exercise from low numbers to slightly higher (groups **W-X**) seems to reduce cases more than increasing activity from groups **Y-Z** • cholesterol and family history do not correlate with heart disease **against** • other factors also increase / decrease / correlate with changing hours of exercise • smoking correlates with changing hours of exercise • smoking correlates with heart disease • % fat in diet also correlates with lack of exercise and heart disease • limitations such as only studied men, not women / children • unknown how many people are in each category or what percentage (of each group) had heart disease	

6

[14]

9. (a) (boil ethanol) in a water bath

1

(b) (test) add iodine (solution)

1

(result) blue-black

allow black
allow blue / black
allow dark blue
ignore purple unqualified

1

(c) solvent moves through paper

1

different pigments have different solubilities in solvent
or
different pigments have different attractions for the paper

1

(and so) are carried different distances

1

allow references to solvent as the mobile phase and paper as the stationary phase

(d) any **one** from:

- R_f values overlap
  or
  0.20 is within range for two pigments
- R_f ranges overlap
- could be chlorophyll b or xanthophyll
- there may be other pigments (that are not in table 2)

1

(e) $(R_f \text{ value}) = \dfrac{\text{distance moved by substance}}{\text{distance moved by solvent}}$

1

$0.89 = \dfrac{\text{distance moved by substance}}{140}$

or

$0.98 = \dfrac{\text{distance moved by substance}}{140}$

1

(distance moved by substance)
= 0.89 × 140
or
= 0.98 × 140

1

= 125 / 124.6 **or** 137 / 137.2

1

(from) 125 / 124.6 (mm to) 137 / 137.2 (mm)

1

*an answer of (from) 125 / 124.6 (mm to) 137 / 137.2 (mm) scores **5** marks*

*calculation using an incorrect distance moved by solvent scores a maximum of **4** marks*

(f) **Level 3:** Relevant points (reasons / causes) are identified, given in detail and logically linked to form a clear account.

5–6

Level 2: Relevant points (reasons / causes) are identified, and there are attempts at logically linking. The resulting account is not fully clear.

3–4

Level 1: Points are identified and stated simply, but their relevance is not clear and there is no attempt at logical linking.

1–2

No relevant content

0

Indicative content

- variation arising from mutations
- mutations occurring randomly
- produce a different protein / pigment / enzyme responsible for pigment production
- produce if more likely to survive
- will pass on favourable genes
- idea of timescale
- if more light captured, faster rate of photosynthesis
- increased photosynthesis causes faster growth
- outcompete neighbouring plants
- different colours of light have different wavelengths
- absorbing wider range of wavelengths means more light is absorbed
- more likely to survive in changing conditions

[18]