

GCSE

BIOLOGY

AQA - COMBINED SCIENCE

MARK SCHEME

B5

HOMEOSTASIS & RESPONSE

TEST 2

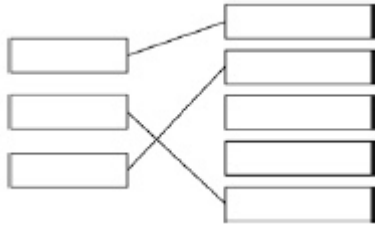
Mark schemes

- 1** (a) A 1
- (b) D 1
- (c) A = synapse 1
- B = motor (neurone) 1
- in this order only*
- (d) a reflex action 1
- (e) 12 (ms) 1
- 0.012 (s) 1
- an answer of 0.012 (s) scores 2 marks*
- (f) A 1
- (g) controls the release of an egg 1
- (h) in the blood(stream) 1
- allow in the plasma / blood vessels*
- do **not** accept in blood cells / platelets*
- (i) (person) C 1
- any **one** from:
- the testosterone level is high(er)
allow testosterone is the main male (sex) hormone
 - the oestrogen **and / or** progesterone levels are low
 - the oestrogen and progesterone levels do not rise and fall as they do in a menstrual cycle
allow there is no menstrual cycle
- no marks if A or B given*

[12]

2

(a)



1
1
1

(b) 23%

allow 1 mark for evidence of pill + condom = 180°/50%

2

(c) any **two** from:

- want to have a baby
- not having sex
- past the menopause
- pregnant

allow any sensible reason

2

(d)

Level 2: Scientifically relevant features are identified; the way(s) in which they are similar/different is made clear and (where appropriate) the magnitude of the similarity/difference is noted.	3-4
Level 1: Relevant features are identified and differences noted.	1-2
No relevant content	0
Indicative content combined pill <ul style="list-style-type: none">• A – easy to take, very effective and free on NHS, but• D – it can cause headaches/side effects, must remember to take it every day condom <ul style="list-style-type: none">• A – only need it when you have sex, no side effects, very inexpensive, but• D – it is not as reliable, more difficult to use sterilisation <ul style="list-style-type: none">• A – 100% effective but• D – probably will not be able to have a family, risks of surgery	

4

[11]

3

(a) all points plotted accurately

allow ± 0.5 small square tolerance

allow 1 mark for 3 or 4 points plotted accurately

2

line of best fit drawn

1

(b) extrapolation on graph

1

9.5 (%)

allow value in range 9.4–9.6

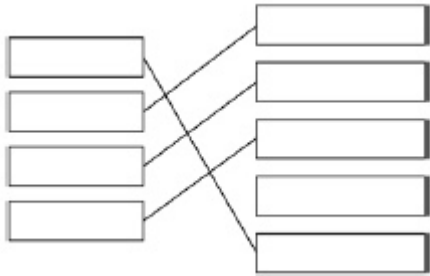
allow correct reading from incorrect extrapolation

1

- (c) any **one** from:
- eating habits may change
 - people are more informed about the causes of diabetes
 - change in exercise patterns
- allow new cure*
- 1
- (d) any **two** from:
- diabetes (in the world) is increasing
- allow low / high income countries are increasing*
- diabetes in low-income countries is rising faster (than high-income / world)
 - high-income countries and low-income countries were the same in 2010
 - high-income countries have been higher than low-income but now / 2018 the situation is reversed
 - diabetes in high-income countries was higher than the world total (from 1986 – 1993) but is now lower
- allow correct use of data*
- 2
- (e) people are becoming more obese
- 1
- people are eating more sugar
- 1
- [10]**
- 4** (a) **A**
- 1
- (b) **F**
- 1
- (c) **B**
- 1
- (d) **D**
- 1
- (e) nucleus
- 1
- (f) (makes reactions) faster
- allow to reduce risk of damage / burns*
- allow for protection / safety*
- 1
- (g) alcohol
- 1
- tiredness
- 1
- [8]**

5

(a)



4 correct = 3 marks
 3 correct = 2 marks
 2 correct = 1 mark
 (4-5)

3

(b) time awake

1

(c) description of how to do a 'ruler drop'

1

how to measure length in cm

1

a control measure taken

or

how to use a conversion chart to get reaction time

1

(d) any **one** sensible reason:

for ruler drop test:

- have lots of equipment
- inexpensive equipment
- many students can do it at same time

for computer test:

- more accurate
- more repeatable
- students can cheat on ruler drop test

1

(e) 0.556..... or

$$(0.44+0.49+0.83+0.27+0.75)/5$$

1

0.56

an answer of 0.56 scores 2 marks

1

- (f) at first stays same / has slight dip (until 12 hours)
12 hours only needed once 1
- increases from 12 hours awake
ignore 'increases' alone 1
- (g) **either:**
 does support, because overall goes up
or
 does not support, because it goes down / stays the same at first and only goes up after 12 hours 1
- (h) any **two** from:
 • use more volunteers
 • make sure they all do the same activities at the same time
 • give them the same food and coffee/tea at the same time
 • control the age / gender of volunteers
 • make sure they all had a good night's sleep the night before the investigation began 2

[15]

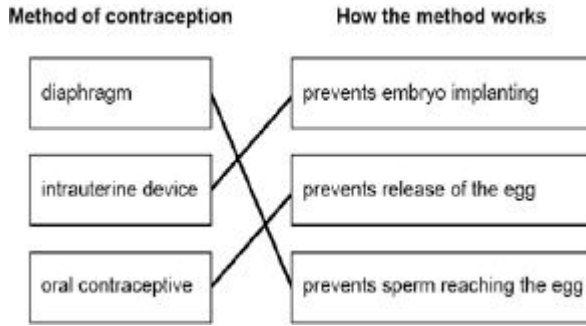
6

- (a) (hormonal uses chemicals / synthetic) hormones to prevent an egg being released
allow 'to prevent maturation of eggs' 1
- (non-hormonal has a barrier which) prevents the sperm reaching an egg **or** prevents implantation 1
- a correct example of each type 1
- (b) suitable scales and axes labels correct 1
- all points plotted accurately
allow 1 mark for 5 accurate points 2
- line of best fit
allow a bar chart for max 3 marks 1
- (c) decrease egg production 1
- by between 6–10 times
allow ecf from their graph 1

[9]

7

(a)



2

2 marks for all 3 correct
allow 1 mark for 1 or 2 correct

(b) to test for safety / toxicity
or

to test for dangerous / harmful side effects

ignore to test for side effects unqualified

1

(c) **Level 3:** A judgement, strongly linked and logically supported by a sufficient range of correct reasons, is given.

5-6

Level 2: Some logically linked reasons are given. There may also be a simple judgement.

3-4

Level 1: Relevant points are made. They are not logically linked.

1-2

No relevant content

0

Indicative content

allow converse where applicable

- condom effectiveness is lower than oral contraceptive and patch
- hormone patch slightly more effective than oral contraceptive
- all are highly effective
- condoms more easily accessible
- condoms have no serious side effects, oral contraceptive and patch have possible side effects
- only condoms protect against STIs / STDs or named STIs / STDs
- side effects don't affect all women
- could forget to take oral contraceptive, but patch is applied for long time
- could forget to replace patch
- patch is visible

ignore costs

ignore how the contraceptive works

[9]

8

(a) $\frac{33}{72}$

or

0.45833...

allow $\frac{34}{72}$

or

0.47222...

1

0.46 (arbitrary units per hour)

allow 0.47 (arbitrary units per hour)

allow an answer given to 2 significant figures from an incorrect calculation in step 1 for 1 mark

1

(b) any **five** from:

- (during the first days of the cycle) FSH from the pituitary stimulates an egg / follicle to mature
 - FSH stimulates oestrogen from the ovaries
 - oestrogen causes thickening of the uterus lining (in the first half of the cycle)
 - oestrogen inhibits FSH but stimulates LH from the pituitary
 - the high levels of LH stimulate release of the egg / ovulation (on day 14))
 - progesterone is secreted by the (empty) follicle / corpus luteum (after day 14 / ovulation)
 - progesterone maintains the lining of the uterus (during the second half of the cycle)
- or
- progesterone inhibits both FSH and LH
 - progesterone falls (if no pregnancy happens) and uterus lining comes away as the menstrual blood flow

if no other marks awarded allow 1 mark for oestrogen and progesterone are produced by the ovaries and FSH and LH are produced by the pituitary

5

points must be in correct order to gain full credit

(c) any **one** from:

- (lower dose so) fewer side effects
- (patch lasts longer so) don't have to remember to take pill every day
- hormone (from patch) goes directly into bloodstream so (contraception) unaffected by vomiting

1

[8]

9

(a) glucagon

correct spelling only

1

(b) if glucose too high (insulin causes) glucose to enter liver / muscle cells

or

glucose to be converted to glycogen

1

so blood glucose levels fall

1

when glucose gets too low (glucagon causes) glycogen breakdown in liver / muscle cells

allow ecf from part (a)

1

so glucose enters blood and raises level again

1

this is called negative feedback

1

(c) any **two** from:

- polymer
- made of two strands
- (twisted) in a double helix

allow:

- *backbone of strands contains sugar and phosphate groups*
- *(cross) linked by pairs of bases*
- *correct names of four bases or base pairs*

2

(d) contains a code

1

for a sequence of amino acids which forms a specific protein

1

(e) mother **A** (polydactyly)

50% / half of children will have polydactyly if parent is heterozygous as it only takes one allele to show the disorder and half the sperm / ova / gametes will have faulty allele.

1

(and) all / 100% will have polydactyly if parent is homozygous as faulty gene will always be passed on

1

(but) for mother **B** (cystic fibrosis) none / 0% of children will have cystic fibrosis as it would need a second allele from the other parent before the disorder would be present

allow genetic diagram(s) if correct and offspring ratio clearly indicated.

1

[13]

10

(a) (P) synapse

1

(Q) relay neuron(e)

allow intermediate neuron(e)

1

allow phonetic spelling

(b) (in neurone) as electrical impulse

allow electrical potential

ignore signal / message

1

(across synapse / gap P) as diffusion / movement of chemical / neurotransmitter

1

if no mark awarded allow 1 mark for mention of electrical and chemical in that order

(c) the impulse has to travel to the brain (and back)

allow it needs time to be processed by the brain

allow the pathway is (a lot) longer

allow more synapses

1

(d) $120 = \frac{1.6}{\text{time}}$

or

evidence of: $\text{speed} = \frac{\text{distance}}{\text{time}}$

1

0.013(33...)(s) **or** $\frac{1}{75}$

1

13(.33...) (ms)

an incorrect answer correctly converted to ms scores 1 mark

1

(e) as age (in years) increases the time for the muscle to contract increases

*do **not** accept directly proportional*

1

at an increasing rate

allow correct description of 'at an increasing rate'

1

[10]