PEARSON EDEXCEL IGCSE BIOLOGY · 4BI1

# BIOLOGY



## MARK SCHEME

### SECTION 3: REPRODUCTION AND INHERITANCE (PACK 2)

| SCORE | PERCENTAGE |
| --- | --- |
| /198 | % |

STEMUP

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# Mark Scheme

Q1.

| Question Number | Answer | Additional guidance | Mark |
|---|---|---|---|
| **(a)(i)** | X: stigma (1)<br><br>Y: anther (1) | | **2** |

| Question Number | Answer | Additional guidance | Mark |
|---|---|---|---|
| **(a)(ii)** | An explanation that makes reference to three of the following:<br><br>• insect (pollination) / bee / eq (1)<br><br>• (because it has) large petals / eq (1)<br><br>• (and) Y / anthers / stamen, within the flower / not hanging out / eq (1)<br><br>• (and) X / stigma within the flower / not feathery / not hanging out / eq (1) | **Ignore** colours / scents / bright / nectar(y)<br><br>**Allow** the structures given in part (i) are within the petals if they are correct | **3** |

| Question Number | Answer | Additional guidance | Mark |
|---|---|---|---|
| **(b)(i)** | *ungerminated seeds*: starch (1)<br><br>*germinating seeds*: starch and, <u>glucose</u> / <u>sugar</u> / <u>maltose</u> (1) | **Reject** if additional incorrect substances listed e.g. protein, fats<br><br>**Reject** if additional incorrect substances listed e.g. protein, fats | **2** |

| Question Number | Answer | Additional guidance | Mark |
|---|---|---|---|
| **(b)(ii)** | An explanation that makes reference to three of the following:<br><br>*In ungerminated seeds:*<br>• starch is for (energy) storage (1)<br>• as it is insoluble / does not affect osmosis / eq (1)<br>*In germinating seeds:*<br>• (water activates) enzymes / amylase / carbohydrase (1)<br>• digests / converts / breaks down starch into maltose / glucose / sugar (1)<br>• (glucose is used in) respiration / for energy (1) | **Allow** converse throughout<br><br>**Allow** starch is a store<br><br>**Allow** starch not broken down into glucose in ungerminated seeds<br>**Allow** less / no respiration in ungerminated seed | **3** |

| Question Number | Answer | Additional guidance | Mark |
|---|---|---|---|
| **(b)(iii)** | An explanation that makes reference to two of the following:<br>• allows oxygen in (1)<br>• for germination / respiration / eq (1)<br>• allows carbon dioxide to escape / eq (1) | **Ignore** oxygen and carbon dioxide<br><br>**Reject** if carbon dioxide <u>for</u> respiration<br><br>**Ignore** light / references to photosynthesis | **2** |

Q2.

| Question Number | Answer | Mark |
|---|---|---|
| **(a)** | A oesophagus / gullet (1)<br><br>B stomach (1)<br><br>C small intestine / ileum / duodenum / jejunum (1)<br><br>D large intestine / colon / eq (1) | **4** |

| Question Number | Answer | additional guidance | Mark |
|---|---|---|---|
| **(b)** | An explanation that makes reference to three of the following:<br><br>• (plants contain) cellulose (1)<br><br>• digested by cellulase / enzyme (1)<br><br>• into <u>glucose</u> (1)<br><br>• energy released / respiration / eq (1) | <br><br><br>allow broken down by cellulase<br><br><br>converse for no cellulase energy not released / energy lost in feaces / eq | **3** |

| Question Number | Answer | Mark |
|---|---|---|
| **(c)(i)** | • humans do not digest cellulose / do not eat only plant material / omnivores / eat fewer / less plants / vegetables / eq (1) | **1** |

| Question Number | Answer | additional guidance | Mark |
|---|---|---|---|
| **(c)(ii)** | An answer that makes reference to two the following:<br><br>• removes <u>useful</u> bacteria / fewer / no useful bacteria / eq (1)<br><br>• reduces competition / eq (1)<br><br>• pathogenic bacteria increase / survive / multiply / grow / more harmful bacteria / eq (1) | <br><br>not just appendix contains useful bacteria as this is in stem<br><br><br>allow toxic / bad / eq to harmful bacteria | **2** |

Q3.

| Question Number | Answer | Additional guidance | Mark |
|---|---|---|---|
| **(a)(i)** | • section / length / part / eq, of DNA / chromosome, that codes for a protein / polypeptide (1) | **Ignore** strand | **1** |

| Question Number | Answer | Additional guidance | Mark |
|---|---|---|---|
| **(a)(ii)** | FF <u>and</u> Ff | **Allow** FF and fF<br>**Allow** FF, Ff, and fF<br>**Allow** alternative letters | **1** |

| Question Number | Answer | Additional guidance | Mark |
|---|---|---|---|
| **(b)(i)** | C (4) is the only correct answer<br>A is not correct as 1, 4, 5 and 6 must be heterozygous<br>B is not correct as 2, 3 and 7 must be homozygous<br>D because only 2, 3 and 7 are not heterozygous | | **1** |

| Question Number | Answer | Additional guidance | Mark |
|---|---|---|---|
| **(b)(ii)** | An answer that makes reference to:<br>• parental genotypes of Ff and ff (1)<br>• gametes as F + f <u>and</u> f (+ f) (1)<br>• correct $F_1$ genotypes (Ff, ff) in correct ratio (1)<br>• 0.5 / 50% / ½ (1) | MP1-3 from Punnet square<br>**Allow** ecf **ONLY** for MPs 2 and 3 with incorrect parental genotypes<br>**Allow** different letters | **4** |

| Question Number | Answer | Additional guidance | Mark |
|---|---|---|---|
| **(b)(iii)** | An answer that makes reference to three from:<br>• feather is discontinuous / categoric / height is continuous / eq (1)<br>• height is polygenic (1)<br>• height depends on the combination of many / several, genes / not just one gene / eq (1)<br>• height may have environmental effects (1)<br>• feather structure is due to one gene / monogenic (1)<br>• height depends on sex (1) | **Allow** named factors e.g. nutrition | **3** |

Q4.

| Question Number | Answer | Mark |
|---|---|---|
| **(a)(i)** | An explanation that makes reference to three of the following points:<br>• oxygen (1)<br>• glucose (1)<br>• respiration (1)<br>• energy / ATP (1) | **3 exp** |

| Question Number | Answer | Additional guidance | Mark |
|---|---|---|---|
| **(a)(ii)** | An explanation that makes reference to two of the following points:<br>• antibodies (from mother) (1)<br>• (bind to) antigens (1)<br>• to kill bacteria / pathogen / virus eq (1) | **Allow** destroy / bind to pathogens / clump pathogens / mark / label pathogen | **2 grad** |

| Question Number | Answer | Additional guidance | Mark |
|---|---|---|---|
| **(b)** | An answer that makes reference to two of the following points:<br>• fetus is female / a girl (1)<br>• cells contain 46 chromosomes / 23 pairs / has a diploid number / has two sets of chromosomes / normal number of chromosomes / eq (1)<br>• chromosomes have different lengths / sizes / shapes (1) | **Allow** does not have Down's syndrome / | **2 exp** |

| Question Number | Answer | Mark |
|---|---|---|
| **(c)(i)** | An answer that makes reference to four of the following points:<br>• calcium for bone / teeth growth / bone / teeth development / prevent rickets (1)<br>• protein to grow / for enzymes / antibodies / eq (1)<br>• iron for haemoglobin / red blood cells / prevent anaemia (1)<br>• vitamin D for bone growth / bone development / calcium absorption / strong bones (1)<br>• more energy as baby is heavy / mother becomes heavy / more energy for fetal development / to carry baby / eq (1) | **4 exp** |

| Question Number | Answer | Additional guidance | Mark |
|---|---|---|---|
| **(c)(ii)** | • 9 = 50% more (1)<br>• 100% = 9 × 2 = 18 (1)<br>• 18 + 9 = 27 (1) | **Allow** one mark for 0.5 / 50% / ½ / times 2<br><br>**Allow** 18 for two marks<br><br>Award full marks for correct numerical answer without working | **3 exp** |
| | | | Total 14 |

Q5.

| Question Number | Answer | additional guidance | Mark |
|---|---|---|---|
| **(a)** | • only expressed / seen in phenotype of homozygous / requires two / both (copies) to be expressed in phenotype / only seen / expressed / shown if no dominant allele present / not expressed if dominant allele present / eq (1) | allow only expressed if aa / cc etc | **1** |

| Question Number | Answer | additional guidance | Mark |
|---|---|---|---|
| **(b)(i)** | • Parents Aa and Aa (1)<br>• gametes A and a (1)<br>• offspring genotypes AA Aa aa (1)<br>• offspring phenotypes or ratio 3 no symptoms to 1 alkaptonuria / eq (1)<br><br>eg parents AN and AN<br><br>gametes A and N<br><br>offspring AA AN AN NN | allow other symbols<br><br>allow different letters eg A and N if cross works<br><br>NOT X and Y<br><br>gametes circled or in Punnet or separated<br><br>allow ecf for max 2 marks for correct gametes and offspring ie mp 2 and 3<br><br>allow full marks for Punnet square | **4** |

| Question Number | Answer | Mark |
|---|---|---|
| **(b)(ii)** | 0.375/ 37.5% / 3/8 / eq (1) | **1** |

| Question Number | Answer | additional guidance | Mark |
|---|---|---|---|
| **(c)(i)** | did not receive the drug / no treatment / eq (1) | current best treatment / placebo | **1** |

| Question Number | Answer | Additional guidance | Mark |
|---|---|---|---|
| **(c)(ii)** | An answer that that makes reference to five of the following points:<br>yes<br>• control group so valid study /eq (1)<br>• showed improvement /reduced symptoms / activity / life / eq (1)<br>• quicker to stand up/eq (1)<br>• improved distance walked/ eq (1)<br>No because<br>• small group size / should be tested on more people / repeat study / eq (1)<br>• not all finished study/ eq (1)<br>• adverse / side effects / eq (1)<br>• one died in drug group /eq (1)<br>• no information on age / mass / sex / other health conditions / activity / exercise / eq (1) | allow converse for control | **5** |

| Question Number | Answer | additional guidance | Mark |
|---|---|---|---|
| **(d)** | An answer that that makes reference to two of the following points:<br>• patients may not know what foods contain these / what proteins contain these/ eq (1)<br>• present in many / most foods / most proteins /eq (1)<br>• proteins required for growth / repair / eq (1) | allow contain these proteins<br>allow provide essential amino acids | **2** |

Q6.

| Question Number | Answer | additional guidance | Mark |
|---|---|---|---|
| **(a)(i)** | • agouti (1)<br><br>• all offspring are agouti / no offspring are black / as allele always expressed / shown / visible in all phenotype / expressed in heterozygous / black allele not expressed / /eq (1) | allow<br><br>ignore passed on as black allele also passed on<br><br>otherwise, all the black parents would need to be heterozygous and even then only 0.5 probability that each is black / eq (1) | **2** |

| Question Number | Answer | additional guidance | Mark |
|---|---|---|---|
| **(a)(ii)** | An answer that makes reference to two the following:<br><br>• parent genotypes Aa and Aa (1)<br><br>• parent gametes (1) A or a A or a<br><br>• offspring genotypes AA Aa aa (1)<br><br>• offspring phenotypes labelled or ratio 3 : 1 (1) | allow from Punnett square<br><br>allow other letters allow A and b<br><br>eg<br><br>Ab x Ab<br><br>A or b A or b<br><br>AA Ab bb<br><br>ignore X and Y<br><br>ECF max 2 for mp 2 gametes and mp 3 genotypes of offspring | **4** |

| Question Number | Answer | additional guidance | Mark |
|---|---|---|---|
| **(a)(iii)** | • probability of agouti / probability of male<br>• multiplied<br><br>⅜ or 0.375 or 37.5% (2) | allow full marks for correct answer no working<br><br>1 mark for 0.5 or ½ or 50%<br><br>or 0.75 or ¾ or 75% | **2** |

| Question Number | Answer | Mark |
|---|---|---|
| **(b)(i)** | polygenic (1) | **1** |

| Question Number | Answer | additional guidance | Mark |
|---|---|---|---|
| **(b)(ii)** | An explanation that makes reference to three of the following:<br><br>• more <u>adrenaline</u> produced / affects amount of <u>adrenaline</u> produced / eq (1)<br><br>• affects heart rate / fear response / fight or flight idea /eq (1)<br><br>• neurotransmitter levels affects <u>synapses</u> / eq (1)<br><br>• quicker reflex / reaction time / quicker response / more responsive / eq (1) | allow converse for smaller adrenal and less neurotransmitter | **3** |

| Question Number | Answer | additional guidance | Mark |
|---|---|---|---|
| **(c)** | An explanation that makes reference to three of the following:<br><br>• iris does not block / blocks less light / eq (1)<br><br>• so pupil change / dilate / constrict has little / no effect / (iris) cannot regulate / control amount of light entering eye / eq (1)<br><br>• <u>too much</u> light / <u>more light</u> enters eye / falls on retina / eq (1)<br><br>• poor vision / damages retina / (goes) blind / eq (1) | not just iris lets light through | **3** |
| | | | total 15 marks |

Q7.

| Question Number | Answer | additional guidance | Mark |
|---|---|---|---|
| **(a)** | • (the allele coding for) grey | allow grey mouse allow grey male mouse | **1** |

| Question Number | Answer | additional guidance | Mark |
|---|---|---|---|
| **(b)(i)** | An answer that makes reference to the following points:<br><br>• parent genotypes aa x Aa (1)<br><br>• correct gametes for parents a and a or A (1)<br>• offspring genotypes aa and Aa (1)<br>• phenotypes white (aa) and grey (Aa) (1) | allow G and W<br><br>allow full marks from Punnet square<br><br>gametes must be clearly shown separated or in circles or in Punnet square<br><br>allow ecf for wrong parent genotypes gametes and offspring mark for 2 max | **4** |

| Question Number | Answer | additional guidance | Mark |
|---|---|---|---|
| **(b)(ii)** | an answer that makes reference to one of the following:<br><br>• fertilisation is random / combination of gametes is random / eq (1)<br><br>• due / by chance / to chance / eq (1) | it is a probability doesn't happen every time | **1** |

| Question Number | Answer | additional guidance | Mark |
|---|---|---|---|
| **(b)(iii)** | • probability of male 0.5 / eq<br>• probability of white 0.5/eq<br><br>so combined = 0.5 x 0.5<br><br>0.25 / 25% / ¼ (2) | allow 1 mark for 0.5 /eq<br><br>full marks for correct answer no working | **2** |

| Question Number | Answer | additional guidance | Mark |
|---|---|---|---|
| **(c)** | A description that makes reference to three of the following points:<br><br>• white blood cells (1)<br>• phagocytes (1)<br>• (phagocytes) ingesting / engulfing / pathogens / eq (1)<br>• lymphocytes (1)<br>• (lymphocytes) releasing antibodies (1) | phagocytes release antibodies scores mp 2 but not mp5<br><br>white blood cells produce antibodies scores mp1 and mp 5 | **3** |

Q8.

| Question Number | Answer | Additional guidance | Mark |
|---|---|---|---|
| **(a)** | An answer that makes reference to **two** of the following points:<br><br>• large petals / coloured petals /flowers / eq (1)<br>• scented / eq (1)<br>• nectaries / nectar (1)<br>• enclosed stamens / enclosed stigma / sticky stigma / eq (1) | Allow smell | **2** |

| Question Number | Answer | Additional guidance | Mark |
|---|---|---|---|
| **(b)(i)** | An explanation that makes reference to **two** of the following points:<br><br>• has no stamens / anthers / no male part /eq (1)<br><br>• no pollen produced / male gamete / eq (1)<br><br>• no fertilisation / pollination / eq (1) | Allow converse | **2** |

| Question Number | Answer | additional guidance | Mark |
|---|---|---|---|
| **(b)(ii)** | An answer that includes :<br><br>• parent genotypes Dd (1)<br><br>• correct gametes shown D or d (1)<br><br>• correct offspring genotypes shown DD Dd Dd dd (1)<br><br>• correct offspring phenotypes shown / ratio shown or key shown/eq (1) | allow other symbols<br><br>allow all 4 marks from suitable Punnett square<br><br>allow ECF for 2 max gametes and offspring genotypes from any parents | **4** |

| Question Number | Answer | additional guidance | Mark |
|---|---|---|---|
| **(b)(iii)** | 0.25 / ¼ / 25%<br><br>of 600<br><br>= 150 (2) | allow full marks for correct answer with no working<br><br>allow 1 mark for 0.25 / ¼ / 25%<br><br>allow ecf from (b) (ii)<br><br>so if offspring shown in 5bii are 50% double allow 300 as answer here. | **2** |
| | | | Total 10 marks |

Q9.

| Question number | Answer | Mark |
|---|---|---|
| (a)(i) | A graph showing:<br><br>• $y$-axis scale half grid and linear (1)<br>• bars drawn with lines (1)<br>• $x$-axis labelled age and $y$-axis labelled mean maximum, and $x$-axis units as years and $y$-axis units as $dm^3$ (1)<br>• bars plotted correctly (1)<br>• key males/females (1) | 5 |

| Question number | Answer | Mark |
|---|---|---|
| (a)(ii) | Subtraction<br>5.2 − 2.1 = 3.1 (1) | 1 |

| Question number | Answer | Mark |
|---|---|---|
| (a)(iii) | An explanation that makes reference to three of the following points:<br><br>• mean maximum lung volume for males is greater than females for 16 and 25 (1)<br>• males grow more than females (1)<br>• greater difference from puberty/equivalent (1)<br>• males continue to grow from 16 to 25 (1) | 3 |

| Question number | Answer | Mark |
|---|---|---|
| (b)(i) | B | 1 |

| Question number | Answer | Mark |
|---|---|---|
| (b)(ii) | An explanation that makes reference to two of the following points:<br><br>• different body mass/size (1)<br>• taking more exercise/equivalent (1)<br>• smoking (1)<br>• asthma/lung disease/equivalent (1)<br>• genetics/inheritance (1) | 2 |

**(Total for question = 12 marks)**

Q10.

| Question Number | Answer | Mark |
|---|---|---|
| **(a)(i)** | C cytoplasm<br><br>*A is not correct as cellulose is not found in the bacterium*<br><br>*B is not correct as chitin is not found in the bacterium*<br><br>*D is not correct as a nucleus is not found in the bacterium* | **1 comp** |

| Question Number | Answer | Mark |
|---|---|---|
| **(a)(ii)** | C 7<br><br>*A is not correct because 1 is not neutral pH*<br><br>*B is not correct because 2 is not neutral pH*<br><br>*D is not correct because 12 is not neutral pH* | **1 comp** |

| Question Number | Answer | additional guidance | Mark |
|---|---|---|---|
| **(a)(iii)** | An explanation that makes reference the following points:<br><br>• mutation (1)<br><br>• variation (1)<br><br>• <u>survive</u> (1)<br><br>• reproduce / breed / offspring (1)<br><br>• pass on allele / gene (1) | | **4 exp** |

| Question Number | Answer | Mark |
|---|---|---|
| **(b)** | An answer that makes reference the following points:<br><br>• probiotic / cranberry / both / treatments (better than control) reduce (bacteria) /eq(1)<br><br>• more reduction if taken together / eq (1)<br>• cranberry (alone) reduces more than probiotic (alone) / eq(1) | **2 grad** |
| | | Total 8 marks |

Q11.

| Question Number | Answer | Mark |
|---|---|---|
| **(a)** | <table><tr><th>Example of process</th><th>Name of process</th></tr><tr><td>plants with a short growing season survive drought</td><td>**natural selection**</td></tr><tr><td>growth of algae in rivers polluted by fertiliser</td><td>eutrophication (1)</td></tr><tr><td>pollen transferred from one plant to another by an insect</td><td>insect pollination (1)</td></tr><tr><td>absorption of nitrate ions from soil using ATP</td><td>active transport (1)</td></tr></table> | **3** |

| Question Number | Answer | additional guidance | Mark |
|---|---|---|---|
| **(b)(i)** | An explanation that makes reference to four of the following points:<br>• (more) grass flourishes / grows well / survives / not killed by zinc / eq (near mine) (1)<br>• less competition (1)<br>• mutation (1)<br>• reproduce (1)<br>• pass allele / gene / DNA on to offspring (1) | other species killed by zinc near mine | **4** |

| Question Number | Answer | additional guidance | Mark |
|---|---|---|---|
| **(b)(ii)** | A description that makes reference to four of the following points:<br>• use tape measure (1)<br>• quadrat (1)<br>• repeat / several (1)<br>• count plants / estimate percentage cover described (1) | allow belt transect for mp1<br>allow for quadrats<br>how many | **4** |
| | | | Total 11 marks |

Q12.

| Question Number | Answer | Mark |
|---|---|---|
| **(a)** | • nucleus | **1 cler** |

| Question Number | Answer | Additional guidance | Mark |
|---|---|---|---|
| **(b)** | convert length into µm<br>60 mm = 60 000 µm (1)<br><br>division<br>60 000 ÷ 6 = ×10 000 (1) | award full marks for correct numerical answer without working<br><br>1 mark for 60 000<br><br>or dividing by 6 | **2 exp** |

| Question Number | Answer | Mark |
|---|---|---|
| **(c)(i)** | A 0.33<br><br>*B is not correct as 3 is not the mean*<br><br>*C is not correct as 10 000 is not the mean*<br><br>*D is not correct as 75 000 000 is not the mean* | **1 comp** |

| Question Number | Answer | additional guidance | Mark |
|---|---|---|---|
| **(c)(ii)** | An answer that makes reference to the following:<br><br>• sperm smaller / sperm is small cell / eq (1)<br><br>• fewer (total) mitochondria (per cell) (1)<br><br>• more mitochondria per volume / per $\mu m^3$ (1)<br><br>• uses <u>energy</u> to swim / move / get to /eq (1)<br><br>• fertilise egg (1) | **allow converse for egg**<br><br>larger<br><br>more<br><br>fewer<br><br>does not move<br><br>egg is fertilised | **3 exp** |
| | | | Total 7 marks |

Q13.

| Question Number | Answer | Mark |
|---|---|---|
| **(a)** | A nucleus (1)<br><br>B mitochondrion / a (1) | 2 |

| Question Number | Answer | Mark |
|---|---|---|
| **(b)(i)** | An answer that includes two of the following points:<br><br>• chloroplast (1)<br>• cell wall (1)<br>• starch grain (1) | **2** |

| Question Number | Answer | Mark |
|---|---|---|
| **(b)(ii)** | • not multicellular / are single-celled / can move from one place to another / has flagella (1) | **1** |

| Question Number | Answer | Mark |
|---|---|---|
| **(c)** | An explanation that makes reference to two of the following points<br><br>• light captured / absorbed by chloroplast / chlorophyll (1)<br>• in photosynthesis (1) | **2** |

| Question Number | Answer | Mark |
|---|---|---|
| **(d)** | • move / propel / swim /eq (1) | **1** |

| Question Number | Answer | Additional guidance | Mark |
|---|---|---|---|
| **(e)** | measure size of line on diagram (= 44 mm 43-45) (1)<br><br>×1000 convert mm into µm (1)<br><br>Magnification = size of line in µm ÷15 µm<br><br>44000÷15 = 2933<br><br>allow 2 marks for any mag **between 2667 and 3000** | 40-45mm<br><br>1mark for<br><br>×1000<br><br>if measured in cm allow 1 for × 10000 | **2** |
| | | | **total 10 marks** |

Q14.

| Question Number | Answer | Mark |
|---|---|---|
| **(a)** | The only correct answer is B 1<br><br>A is not correct as 0 is not the correct number of chromosomes<br><br>C is not correct as 2 is not the correct number of chromosomes<br><br>D is not correct as 23 is not the correct number of chromosomes | **1** |

| Question Number | Answer | Mark |
|---|---|---|
| **(b)** | An explanation that makes reference to the following points:<br><br>• energy / ATP / respiration /eq (1)<br><br>• movement / swimming / tail movement/ eq (1) | **2** |

| Question Number | Answer | additional guidance | Mark |
|---|---|---|---|
| **(c)** | An explanation that makes reference to two of the following points:<br><br>• digest / break down egg membrane / eq (1)<br><br>• allow (nucleus) to enter / penetrate egg (1)<br><br>• fertilisation / fusion (1) | ignore wall / shell etc | **2** |

| Question Number | Answer | Additional guidance | Mark |
|---|---|---|---|
| **(d)** | An answer that makes reference to 2 of the following points:<br><br>• vagina<br>• uterus / womb /cervix<br>• oviduct / fallopian tube | two marks for all 3 in correct order<br><br>one mark for 3 structures wrong order<br><br>one mark for 2 structures in correct order<br><br>vagina oviduct =1<br><br>uterus vagina oviduct = 1<br><br>oviduct vagina = 0<br><br>uterus oviduct = 1<br><br>vagina uterus = 1<br><br>ign route after fertilisation | **2** |
| | | | Total = 7 marks |

Q15.

| Question Number | Answer | additional guidance | Mark |
|---|---|---|---|
| | C use plants with different coloured flowers / (1)<br><br>O of same species / size / shape / (of flower) eq (1)<br><br>R repeat each colour (1)<br><br>M1 count / see how many insects land on / visit flower / eq (1)<br><br>M2 in a **stated** time / eq (1)<br><br>S1 same scent / nectar / use paper flowers / same location/ temperature /sunlight / same season /same time of day /eq (1)<br><br>S2 same number of / same insects / bees / pollinators / same distance from hive / eq (1) | ignore colour of <u>plant</u> **once** | **6** |
| | | | total 6 marks |

Q16.

| Question Number | Answer | Mark |
|---|---|---|
| | • sexual (1)<br>• pollen (1)<br>• anther (1)<br>• stigma (1)<br>• bees / moths / flies (1)<br>• large / big / scented / (sweet) smelling (1)<br>• style (1)<br>• fertilisation (1) | **8 grad** |
| | | Total 8 marks |

Q17.

| Question Number | Answer | Mark |
|---|---|---|
| **(a)(i)** | B is the only correct answer<br><br>A is incorrect as ovulation does not occur in the oviduct<br><br>C is incorrect as ovulation does not occur in the uterus<br><br>D is incorrect as ovulation does not occur in the vagina | **1** |

| Question Number | Answer | Mark |
|---|---|---|
| **(a)(ii)** | A is the only correct answer<br><br>B is incorrect as fertilisation does not normally occur in the ovary<br><br>C is incorrect as fertilisation does not usually occur in the uterus<br><br>D is incorrect as fertilisation does not usually occur in the vagina | **1** |

| Question Number | Answer | Additional guidance | Mark |
|---|---|---|---|
| **(b)(i)** | X: oestrogen / estrogen (1)<br><br>Y: progesterone (1) | **Accept** other correct names | **2** |

| Question Number | Answer | Additional guidance | Mark |
|---|---|---|---|
| **(b)(ii)** | An description that makes reference to two of the following:<br><br>• repairs / thickens the uterus lining / endometrium / eq (1)<br><br>• for implantation / eq (1) | **Accept** reduces FSH levels / eq (1)<br><br>**Accept** stimulates release of LH / eq (1) | **2** |

| Question Number | Answer | Mark |
|---|---|---|
| **(c)** | An explanation that makes reference to three of the following:<br><br>• villi providing a large surface area (1)<br><br>• for diffusion / active transport (1)<br><br>• capillaries bring / blood supply brings nutrients / remove(s) waste products / eq (1)<br><br>• blood supply / capillaries / blood vessel to maintain a diffusion gradient (1)<br><br>• close distance between mother's and fetal blood for short diffusion pathway (1) | **3** |

Q18.

| Question Number | Answer | **Mark** |
|---|---|---|
| **(a)(i)** | B | **1** |

| Question Number | Answer | Additional guidance | Mark |
|---|---|---|---|
| **(a)(ii)** | An answer that makes reference to the following:<br><br>• development of secondary sexual characteristics / named secondary sexual characteristic (1) | **Allow** repair / thickens of uterus lining / stimulate release of LH / inhibits FSH | **1** |

| Question Number | Answer | Mark |
|---|---|---|
| **(b)(i)** | • zygote | **1** |

| Question Number | Answer | Additional guidance | Mark |
|---|---|---|---|
| **(b)(ii)** | • 14 cm = 140 mm<br>• 140 ÷ 3.0 = 47 (46.67)<br><br>**2 marks for 46.67 – 47**<br><br>**Allow 46.6 recurring =2** | award full marks for correct numerical answer without working<br><br>46 / 46.6 scores 1<br><br>allow 1 mark for 467 to 470 or 4.67 to 4.7 /eq in answer right digits wrong power | **2** |
| | | | **Total 5** |

Q19.

| Question Number | Answer | Additional guidance | Mark |
|---|---|---|---|
| **(a)** | (number of plants) (2)<br>number of primary consumers 2 or two<br>number of carnivores 2 or two<br>number of food chains 6 or six | Mark each row independently. | **3 cler** |

| Question Number | Answer | Additional guidance | Mark |
|---|---|---|---|
| **(b)** | An answer that makes reference to two of the following points:<br>• coloured / bright / large petals (1)<br>• enclosed anthers / short filaments (1)<br>• enclosed stigma / short style (1)<br>• sticky stigma / sticky pollen / rough surface on pollen (1)<br>• scent / eq / (1) | | **2 grad** |

| Question Number | Answer | Additional guidance | Mark |
|---|---|---|---|
| **(c)(i)** | • select correct slope 1.3-0.7 (1)<br>• calculation 0.6 (1) | Award full marks for correct numerical answer without working<br>Award one mark for correct slope values 1.3 and 0.7 if final answer incorrect | **2 grad** |

| Question Number | Answer | Mark |
|---|---|---|
| **(c)(ii)** | An answer that makes reference to one of the following points:<br>• taken / fed on / drunk by insects (1)<br>• evaporation (1) | **1 grad** |

| Question Number | Answer | Additional guidance | Mark |
|---|---|---|---|
| **(d)** | An answer that makes reference to two of the following points:<br>• prevent ants eating/removing/destroying <u>pollen</u> (1)<br>• prevent ants / (other) insects from eating <u>flower</u> / named floral part e.g. petal (1)<br>• prevent ants eating other insects / pollinators (1)<br>• more nectar left (for attracting pollinators/other insects) (1)<br>• more chance of being pollinated / can still be pollinated / more pollinators come (1) | For mp1,2,3 ignore 'harm' 'damage' unqualified | **2 exp** |
| | | | Total 10 marks |

Q20.

| Question Number | Answer | Mark |
|---|---|---|
| **(a)(i)** | A - 2<br>*B is incorrect as there are not 3 secondary consumers*<br>*C is incorrect as there are not 4 secondary consumers*<br>*D is incorrect as there are not 5 secondary consumers* | **1** |

| Question Number | Answer | Mark |
|---|---|---|
| **(a)(ii)** | Acacia / plant → (desert) rat → fennec / fox → monitor / lizard → hawk (1) | **1** |

| Question Number | Answer | Additional guidance | Mark |
|---|---|---|---|
| **(a)(iii)** | An explanation that makes reference to three of the following:<br>• (energy is lost due to) indigestible parts / faeces / not absorbed / eq (1)<br>• (energy is lost due to) excretion / metabolic waste / urine / eq (1)<br>• (energy is lost due to) organisms / parts of organisms that are not consumed /eq (1)<br>• (energy is released) in respiration / by heat loss / in active transport / due to metabolism (1)<br>• (energy is lost due to) movement (1) | **Accept** some organisms / food not eaten<br>Accept loss to death / decay | **3** |

| Question Number | Answer | Mark |
|---|---|---|
| **(b)** | An explanation that makes reference to four of the following:<br>• mutation / genetic variation (1)<br>• (the fox has / ears have) large surface area to lose heat / keep body cool (1)<br>• (which) enables survival (1)<br>• breeding occurs / (fox) produces offspring (1)<br>• passes on alleles / genes (for ear shape) (to next generation) (1) | **4** |