



**Cambridge International Examinations**  
Cambridge International General Certificate of Secondary Education

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**BIOLOGY**

**0610/33**

Paper 3 Theory (Core)

**May/June 2017**

MARK SCHEME

Maximum Mark: 80

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**Published**

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This document consists of **13** printed pages.

**Mark schemes will use these abbreviations**

- ; separates marking points
- / alternatives
- **I** **I**
- **R** reject
- **A** **A** (for answers correctly cued by the question, or guidance for examiners)
- AW alternative wording (where responses vary more than usual)
- AVP any valid point
- **ecf** credit a correct statement / calculation that follows a previous wrong response
- **ora** or reverse argument
- ( ) the word / phrase in brackets is not required, but sets the context
- underline actual word given must be used by candidate (grammatical variants excepted)
- max indicates the maximum number of marks that can be given

| Question  | Answer                                                                                                                                                                                                                                       | Marks | Guidance                                                 |
|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|----------------------------------------------------------|
| 1(a)(i)   | photosynthesis ;                                                                                                                                                                                                                             | 1     |                                                          |
| 1(a)(ii)  | water + carbon dioxide ;<br>→ oxygen + glucose ;                                                                                                                                                                                             | 2     |                                                          |
| 1(a)(iii) | large surface area (to absorb light) ;<br>contain chloroplasts / chlorophyll (to absorb light) ;<br>ref. to xylem ;<br>stomata (to allow gas exchange) ;<br>thin (short diffusion distances) ;<br>transparent cuticle / epidermis ;<br>AVP ; | 1     |                                                          |
| 1(b)(i)   | <i>Betula pendula</i> = <b>C</b><br><i>Fraxinus excelsior</i> = <b>D</b><br><i>Laurus nobilis</i> = <b>E</b><br><i>Quercus robur</i> = <b>A</b><br>;;;                                                                                       | 3     | All 4 correct = 3<br>2 or 3 correct = 2<br>1 correct = 1 |

| Question | Answer                                                                                                                                                                                                                                                                                                    | Marks    | Guidance                                                 |
|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|----------------------------------------------------------|
| 1(b)(ii) | does leaf have only 5 parts? ;<br>does the leaf have less than 7 parts? ;<br>do the leaf parts all join at one place? ;<br>does the leaf have more than one vein? ;<br>does the leaf have branched veins? ;<br>does the leaf have more than one vein in each part? ;<br>does the leaf have pointy ends? ; | <b>1</b> | AW but the statement must fit a correct YES or NO choice |

| Question  | Answer                                                                                                                                                                   | Marks | Guidance                        |
|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|---------------------------------|
| 2(a)(i)   | to pump blood / AW ;                                                                                                                                                     | 1     |                                 |
| 2(a)(ii)  | (cardiac) muscle ;                                                                                                                                                       | 1     |                                 |
| 2(a)(iii) | ECG ;<br>(counting the) pulse / heart beat ;<br>using a, heart monitor / pulse monitor / blood pressure meter ;<br>listening (to heart valves closing) ;                 | 2     |                                 |
| 2(b)(i)   | a circle drawn around the coronary artery ;                                                                                                                              | 1     |                                 |
| 2(b)(ii)  | <i>any one from</i><br>diet ;<br>stress ;<br>smoking ;<br>genetic factors ;<br>age / gender ;<br>lack of exercise ;<br>high blood cholesterol ;<br>obese ;<br>diabetes ; | 1     | <b>A</b> family history         |
| 2(b)(iii) | arteries<br>veins ;                                                                                                                                                      | 1     | must have both in correct order |

| Question  | Answer                                            | Marks | Guidance        |
|-----------|---------------------------------------------------|-------|-----------------|
| 2(c)(i)   | right atrium ;                                    | 1     | A right auricle |
| 2(c)(ii)  | ensure one way flow of blood / prevent backflow ; | 1     |                 |
| 2(c)(iii) | septum ;                                          | 1     |                 |

| Question  | Answer                                                                                                                                                                                                                                                                                                      | Marks | Guidance                                                                    |
|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-----------------------------------------------------------------------------|
| 3(a)(i)   | hormones ;                                                                                                                                                                                                                                                                                                  | 1     |                                                                             |
| 3(a)(ii)  | line adrenaline joining to adrenal gland (above kidney) ;<br>line insulin joining to pancreas ;<br>line oestrogen joining to ovary ;                                                                                                                                                                        | 3     |                                                                             |
| 3(a)(iii) | (insulin) pancreas ;<br>(oestrogen) ovary ;                                                                                                                                                                                                                                                                 | 2     |                                                                             |
| 3(a)(iv)  | (Insulin) lowers blood, sugar / glucose<br><i>OR</i><br>(promotes conversion of ) glucose to glycogen ;<br>oestrogen causes lining of uterus to thicken /<br>responsible for (named) secondary sexual characteristics ;                                                                                     | 2     | I regulates / controls<br><br>A regulates the menstrual cycle               |
| 3(b)      | <i>any two from</i><br>pupils are enlarge / dilated ;<br>increased blood glucose concentration ;<br>increased breathing (rate) ;<br>increased, heart / pulse, rate ;<br>increased blood pressure ;<br>expand air passages of lungs ;<br>increased / divert, blood to muscles ;<br>speeds up reaction time ; | 2     | A increased depth / volume of breathing<br><br>A increased mental awareness |

| Question | Answer                                                                                                                                                                                                                                        | Marks | Guidance                          |
|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-----------------------------------|
| 4(a)     | break down of molecules ;<br>large to small molecules / insoluble to soluble molecules ;                                                                                                                                                      | 2     |                                   |
| 4(b)(i)  | amylase ;                                                                                                                                                                                                                                     | 1     |                                   |
| 4(b)(ii) | simple sugars / glucose ;                                                                                                                                                                                                                     | 1     | <b>A</b> maltose / reducing sugar |
| 4(c)(i)  | <b>A</b> ;<br><b>B</b> ;                                                                                                                                                                                                                      | 2     | either order                      |
| 4(c)(ii) | small intestine / ileum / duodenum ;                                                                                                                                                                                                          | 1     | <b>A</b> villi                    |
| 4(d)     | <i>any two from</i><br>secretes (named) enzymes ;<br>storage ;<br>mechanical digestion / described ;<br>secretes hydrochloric acid / provides an acidic pH (for enzymes) / lowers pH / adds liquid ;<br>kills bacteria ;<br>digests protein ; | 2     |                                   |

| Question  | Answer                                                                                                                        | Marks | Guidance                                                             |
|-----------|-------------------------------------------------------------------------------------------------------------------------------|-------|----------------------------------------------------------------------|
| 5(a)(i)   | 37 / 38 (cm <sup>3</sup> ) ;                                                                                                  | 1     |                                                                      |
| 5(a)(ii)  | 4 (minutes) ;                                                                                                                 | 1     | ecf from (a)(i)                                                      |
| 5(a)(iii) | more juice extracted / bigger yield ;<br>faster (extraction) / takes less time ;<br>more profit ;                             | 2     |                                                                      |
| 5(b)(i)   | (chemical reaction in cells that) breaks down, nutrient molecules, to release energy ;<br>without using oxygen ;              | 2     |                                                                      |
| 5(b)(ii)  | biofuel / bread / carbon dioxide ;                                                                                            | 1     | A yeast extract / 'marmite' / CO <sub>2</sub><br>I any named alcohol |
| 5(b)(iii) | uses oxygen ;<br>releases more energy / makes more ATP ;<br>produces water ;<br>does not produce alcohol / ethanol ;<br>AVP ; | 2     | e.g. produces more carbon dioxide                                    |

| Question | Answer                                                                                                                                                                                             | Marks | Guidance |
|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|----------|
| 6(a)     | shoot grows upwards / AW ;                                                                                                                                                                         | 1     |          |
| 6(b)(i)  | gravity ;                                                                                                                                                                                          | 1     |          |
| 6(b)(ii) | gravitropism ;                                                                                                                                                                                     | 1     |          |
| 6(c)(i)  | phototropism ;                                                                                                                                                                                     | 1     |          |
| 6(c)(ii) | the shoot grows towards the, light / stimulus ;<br>(shoot ) receives more light ;<br>plants need light, to make food / for photosynthesis ;<br>food / nutrients, needed for, growth / metabolism ; | 3     |          |

| Question | Answer                                                                                                                                                                                                                    | Marks   | Guidance                                                                                                                                                                                                                                                                                                                                     |   |   |  |         |  |   |  |   |   |                                                                                      |
|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|--|---------|--|---|--|---|---|--------------------------------------------------------------------------------------|
| 7(a)(i)  | <table><tr><td>meiosis</td><td>/</td><td></td><td>/</td><td></td></tr><tr><td>mitosis</td><td></td><td>/</td><td></td><td>/</td></tr></table><br>;;                                                                       | meiosis | /                                                                                                                                                                                                                                                                                                                                            |   | / |  | mitosis |  | / |  | / | 2 | correct answer column 1 and 2 = 1 mark<br><br>correct answer column 3 and 4 = 1 mark |
| meiosis  | /                                                                                                                                                                                                                         |         | /                                                                                                                                                                                                                                                                                                                                            |   |   |  |         |  |   |  |   |   |                                                                                      |
| mitosis  |                                                                                                                                                                                                                           | /       |                                                                                                                                                                                                                                                                                                                                              | / |   |  |         |  |   |  |   |   |                                                                                      |
| 7(b)     | selection by humans / AW ;<br>of individuals(s) with desired features / AW ;<br>crossing / mating / breeding,( them together) ;<br>selecting offspring with desired features and breed again ;<br>over many generations ; | 3       |                                                                                                                                                                                                                                                                                                                                              |   |   |  |         |  |   |  |   |   |                                                                                      |
| 7(c)     | changing the, genetic material / DNA, of an organism ;<br>by using genes ;<br>from another organism ;<br>(adding genes to) confer resistance to, herbicides / insect pests ;<br>to make vitamins ;<br>examples ;          | 4       | <b>A</b> genetically modify an organism<br><br><b>A</b> alleles<br><br>max 2 for examples<br><b>A</b> other examples include :<br>salt tolerance / drought resistance<br>/ growth in harsh conditions<br>nitrogen fixation<br>virus resistance<br>delayed ripening<br>seedless watermelons<br>flavr savr tomatoes<br>make plants grow faster |   |   |  |         |  |   |  |   |   |                                                                                      |
| 7(d)     | herbicides ;<br>insecticide ;<br>fertilisers ;<br>irrigation / watering ;<br>use of machinery ;<br>crop rotation ;<br>biological pest control ;<br>more light ;<br>AVP ;;                                                 | 2       | <b>I</b> weather<br><br><br><br><br><br><br><br><br><br>e.g. pesticides / fungicide                                                                                                                                                                                                                                                          |   |   |  |         |  |   |  |   |   |                                                                                      |

| Question  | Answer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Marks | Guidance                                                                                                 |
|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|----------------------------------------------------------------------------------------------------------|
| 8(a)(i)   | <div style="display: inline-block; border: 1px solid black; padding: 2px 5px;">F</div> ; <div style="display: inline-block; border: 1px solid black; padding: 2px 5px; background-color: #cccccc;">C</div> <div style="display: inline-block; border: 1px solid black; padding: 2px 5px;">A / E</div> & <div style="display: inline-block; border: 1px solid black; padding: 2px 5px;">E / A</div> ; <div style="display: inline-block; border: 1px solid black; padding: 2px 5px; background-color: #cccccc;">D</div> <div style="display: inline-block; border: 1px solid black; padding: 2px 5px;">B</div> ;                                                                                                                                                                                                                                                                                                                                                                                                                            | 3     | 1st box <b>F</b> 1 mark<br>6th box <b>B</b> 1 mark<br>both <b>A E</b> or <b>E A</b> in the middle 1 mark |
| 8(a)(ii)  | mutation ;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 1     |                                                                                                          |
| 8(a)(iii) | mutagens / (named) chemicals e.g. cigarette smoke / dyes ;<br>radiation / x rays / UV ;<br>viruses ;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 1     |                                                                                                          |
| 8(b)(i)   | an inherited feature ;<br>that helps an organism to survive / reproduce ;<br>in its environment ;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 2     |                                                                                                          |
| 8(b)(ii)  | they all have, hair / fur ;<br>all have (external) ears / pinnae ;<br>middle ear bones ;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 2     | must be visible features                                                                                 |
| 8(b)(iii) | mammary glands / production of milk (for offspring) / nipples ;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1     |                                                                                                          |
| 9(a)      | <div style="display: flex; flex-direction: column; align-items: flex-start;"> <div style="display: flex; width: 100%;"> <div style="border: 1px solid black; padding: 5px; width: 45%;">plasma</div> <div style="border: 1px solid black; padding: 5px; width: 45%;">not clotting</div> </div> <div style="display: flex; width: 100%; margin-top: 10px;"> <div style="border: 1px solid black; padding: 5px; width: 45%;">platelets</div> <div style="border: 1px solid black; padding: 5px; width: 45%;">burns patients</div> </div> <div style="display: flex; width: 100%; margin-top: 10px;"> <div style="border: 1px solid black; padding: 5px; width: 45%;">red blood cells</div> <div style="border: 1px solid black; padding: 5px; width: 45%;">low immunity</div> </div> <div style="display: flex; width: 100%; margin-top: 10px;"> <div style="border: 1px solid black; padding: 5px; width: 45%;">white blood cells</div> <div style="border: 1px solid black; padding: 5px; width: 45%;">low haemoglobin</div> </div> </div> | 3     | All 4 correct = 3<br>2 or 3 correct = 2<br>1 correct = 1                                                 |
| 9(b)(i)   | rounder / (bi)concave / fixed shape / disc shaped / doughnut shaped ;<br>lacks a nucleus ;<br>it contains haemoglobin ;<br>smaller ;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 2     | 1 colour                                                                                                 |

| Question | Answer                                                                                                                         | Marks | Guidance |
|----------|--------------------------------------------------------------------------------------------------------------------------------|-------|----------|
| 9(b)(ii) | to prevent (further) blood loss / haemorrhage ;<br>to seal wounds / as a barrier to infection idea / stop pathogens entering ; | 1     |          |