



Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

COMBINED SCIENCE

0653/03

Paper 3 Theory (Core)

For examination from 2019

MARK SCHEME

Maximum Mark: 80

Specimen

This document consists of **9** printed pages and **1** blank page.

Generic Marking Principles

These general marking principles must be applied by all examiners when marking candidate answers. They should be applied alongside the specific content of the mark scheme or generic level descriptors for a question. Each question paper and mark scheme will also comply with these marking principles.

GENERIC MARKING PRINCIPLE 1:

Marks must be awarded in line with:

- the specific content of the mark scheme or the generic level descriptors for the question
- the specific skills defined in the mark scheme or in the generic level descriptors for the question
- the standard of response required by a candidate as exemplified by the standardisation scripts.

GENERIC MARKING PRINCIPLE 2:

Marks awarded are always **whole marks** (not half marks, or other fractions).

GENERIC MARKING PRINCIPLE 3:

Marks must be awarded **positively**:

- marks are awarded for correct/valid answers, as defined in the mark scheme. However, credit is given for valid answers which go beyond the scope of the syllabus and mark scheme, referring to your Team Leader as appropriate
- marks are awarded when candidates clearly demonstrate what they know and can do
- marks are not deducted for errors
- marks are not deducted for omissions
- answers should only be judged on the quality of spelling, punctuation and grammar when these features are specifically assessed by the question as indicated by the mark scheme. The meaning, however, should be unambiguous.

GENERIC MARKING PRINCIPLE 4:

Rules must be applied consistently e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors.

GENERIC MARKING PRINCIPLE 5:







Marks should be awarded using the full range of marks defined in the mark scheme for the question (however; the use of the full mark range may be limited according to the quality of the candidate responses seen).

GENERIC MARKING PRINCIPLE 6:

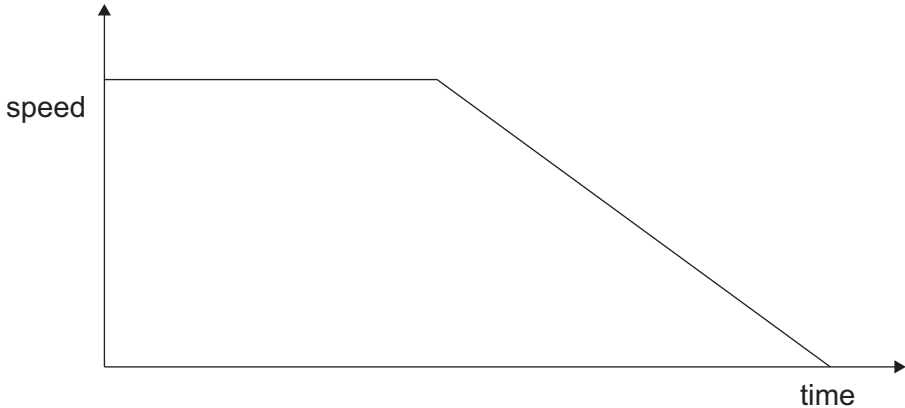
Marks awarded are based solely on the requirements as defined in the mark scheme. Marks should not be awarded with grade thresholds or grade descriptors in mind.

mark scheme abbreviations

| | |
|--------------------|---|
| ; | separates marking points |
| / | alternative responses for the same marking point |
| not | do not allow |
| allow | accept the response |
| ignore | mark as if this material was not present |
| ecf | error carried forward |
| avp | any valid point |
| ora | or reverse argument |
| owtte | or words to that effect |
| underline | actual word given must be used by candidate (grammatical variants excepted) |
| () | the word/phrase in brackets is not required but sets the context |
| max | indicates the maximum number of marks |
| any [number] from: | accept the [number] of valid responses |
| note: | additional marking guidance |

| Question | Answer | Marks | Guidance | | | | | | | | | |
|---|--|---|--|-------------------|---|--------------------|-------------------------------|---|-----------------------|---|---|--|
| 1(a)(i) | (B) one-way valve ; (C) right atrium ; | 2 | | | | | | | | | | |
| 1(a)(ii) | one arrow pointing into the heart through A ; one arrow pointing out of the heart at D ; | 2 | | | | | | | | | | |
| 1(b)(i) | <table border="1"> <thead> <tr> <th>diagram</th> <th>name of cells</th> <th>function of cells</th> </tr> </thead> <tbody> <tr> <td></td> <td>red (blood cell) ;</td> <td>carries / transports oxygen ;</td> </tr> <tr> <td></td> <td>white (blood cells) ;</td> <td>defence against disease-causing organisms / pathogens ;</td> </tr> </tbody> </table> | diagram | name of cells | function of cells |  | red (blood cell) ; | carries / transports oxygen ; |  | white (blood cells) ; | defence against disease-causing organisms / pathogens ; | 4 | allow: produces anti-bodies allow: phagocytosis / engulfs pathogen not: 'eats' (imprecise) |
| diagram | name of cells | function of cells | | | | | | | | | | |
|  | red (blood cell) ; | carries / transports oxygen ; | | | | | | | | | | |
|  | white (blood cells) ; | defence against disease-causing organisms / pathogens ; | | | | | | | | | | |
| 1(b)(ii) | Any one from: controlling centre of the cell ; contains / stores the genetic information (of the cell) ; | 1 | max 1 not: 'brain' allow: contains DNA / genes | | | | | | | | | |

| Question | Answer | Marks | Guidance |
|-----------|--|-------|---|
| 2(a)(i) | in nucleus 6,0 ; outside nucleus 0,6 ; | 2 | |
| 2(a)(ii) | Any two from: equal numbers of protons and electrons ; equal numbers of positive and negative charges ; (protons are positive and) electrons are negative ; | 2 | max 2 |
| 2(b)(i) | coal and petroleum ; | 1 | |
| 2(b)(ii) | methane + oxygen → carbon dioxide + water ; | 2 | note: award 1 mark for reactants award 1 mark for products |
| 2(c)(i) | CH ₄ ; | 1 | |
| 2(c)(ii) | covalent ; | 1 | |
| 2(c)(iii) | 2 ; | 1 | |

| Question | Answer | Marks | Guidance |
|----------|---|-------|--------------|
| 3(a) | speed = distance ÷ time / (time =) distance ÷ speed / 200 ÷ 40 ; = 5 (s) ; | 2 | |
| 3(b) |  <p>horizontal straight line ; followed by descending line, straight or curved, to meet time axis ;</p> | 2 | |
| 3(c) | reduce air resistance/friction due to the air ; | 1 | |
| 3(d) | chemical (energy in the rider) ; thermal/heat (energy during braking) ; | 2 | allow: sound |

| Question | Answer | Marks | Guidance |
|----------|--|-------|----------|
| 4(a)(i) | phototropism ; | 1 | |
| 4(a)(ii) | Any two from: more/better absorption of light ; more/better photosynthesis ; any statement about light hitting leaves at right angles /not at an angle ; increase intensity of received light ; | 2 | max 2 |

| Question | Answer | Marks | Guidance |
|-----------|--|-------|--|
| 4(a)(iii) | In any order – any two pairs of marking points. sensitivity/irritability ; because it is responding to light ; growth ; because it is a growth response ; movement ; because the shoot has moved/changed position in response to the light ; | 4 | max 4 allow: nutrition ; plant is (using light for) photosynthesising/ making food ; note: growth must be linked to the change in the plant shown in Fig. 4.1 |
| 4(b)(i) | shoot X bends towards the light ; shoot Y grows straight up ; shoot Z does not grow ; | 2 | note: award 2 marks for three correct award 1 mark for one or two correct |
| 4(b)(ii) | the tip of the shoot controls the response ; | 1 | |

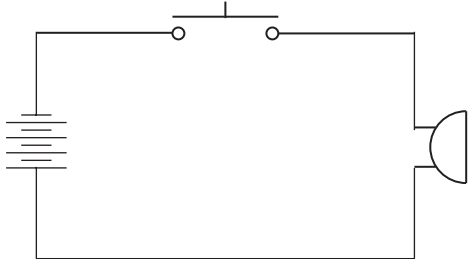
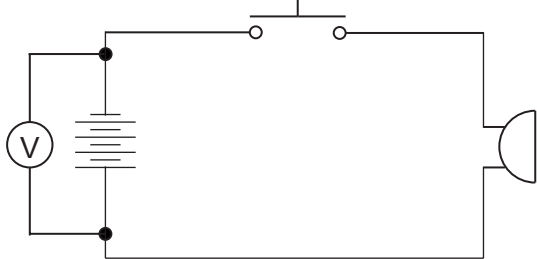
| Question | Answer | Marks | Guidance |
|----------|--|-------|----------|
| 5(a) | lead oxide loses oxygen/is reduced/lead ions gain electrons ; carbon gains oxygen/is oxidised/carbon loses electrons ; | 2 | |
| 5(b) | Any two from: to allow conduction/passage of electricity ; solid does not conduct ; so that ions can move ; | 2 | max 2 |
| 5(c)(i) | electrodes correctly labelled anode and cathode ; electrolyte labelled ; | 2 | |
| 5(c)(ii) | at the positive electrode bromine and at the negative electrode lead ; lead is grey/silver ; bromine is brown/orange ; | 3 | |

| Question | Answer | Marks | Guidance |
|----------|---|-------|----------|
| 6(a)(i) | line A to X is perpendicular to mirror ; distance A to mirror = distance mirror to cross X ; | 2 | |

| Question | Answer | Marks | Guidance |
|-----------|---|-------|--|
| 6(a)(ii) | angles of incidence and reflection are approximately the same ; arrows from beard / A to eye ; | 2 | note: award 2 marks for incident ray from point A to mirror and reflected ray along line from eye to X |
| 6(a)(iii) | angle <i>i</i> correctly labelled ; | 1 | note: the normal line must be drawn |
| 6(b)(i) | A – ultraviolet ; B – radio waves ; | 2 | |
| 6(b)(ii) | S / “short wavelength” written at left end of electromagnetic spectrum ; | 1 | |
| 6(b)(iii) | infra-red – cooking / ovens / grills / heating / remote controls / burglar alarms ; X-rays – medicine / security ; | 2 | avp avp |

| Question | Answer | Marks | Guidance |
|----------|--|-------|---|
| 7(a)(i) | feeding ; | 1 | allow: eating and ingestion ; |
| 7(a)(ii) | decomposers ; | 1 | allow: bacteria and fungi ; |
| 7(b)(i) | glucose + oxygen → carbon dioxide + water ; | 2 | note: award 1 mark for left side and 1 mark for right side |
| 7(b)(ii) | Any two from: heat released more quickly / more heat released ; higher temperature reached ; humans can choose to do it ; no enzymes involved ; does not take place in living cells ; | 2 | max 2 |
| 7(c) | Any two from: habitat destruction ; extinction ; loss of soil ; flooding ; | 2 | max 2 allow: landslides ; drought ; desertification ; increase in frequency / severity of storms ; extinction / endangerment of species / loss of biodiversity ; disrupts food chains / food webs ; avp ; |

| Question | Answer | Marks | Guidance |
|-----------|--|-------|---|
| 8(a) | mass of carbonate used ; | 1 | allow: distance of Bunsen from the tube ; |
| 8(b)(i) | calcium carbonate ; | 1 | |
| 8(b)(ii) | 14 (cm ³) ; | 1 | |
| 8(b)(iii) | slower reaction (down the group) ; | 1 | |
| 8(c) | add acid to carbonate ; bubble gas or carbon dioxide (evolved) through limewater / test gas or carbon dioxide with limewater ; limewater goes milky or cloudy or white precipitate ; | 3 | |

| Question | Answer | Marks | Guidance |
|----------|---|-------|------------------------|
| 9(a)(i) |  <p>complete series circuit ; battery of 4 cells connected correctly ;</p> | 2 | allow: battery symbol |
| 9(a)(ii) |  <p>symbol with correct connections (both required) ;</p> | 1 | allow: across the bell |
| 9(b)(i) | number of vibrations / waves per unit time ; | 1 | |
| 9(b)(ii) | amplitude increased ; frequency unchanged ; | 2 | |

| Question | Answer | Marks | Guidance |
|----------|--|----------|----------|
| 9(c)(i) | $R = V/I/6 \div 2$; 3.0 ; (unit) ohm(s)/ Ω ; | 3 | allow: 3 |
| 9(c)(ii) | current increases/doubles ; | 1 | |

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