



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

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**COMBINED SCIENCE**

**0653/33**

Paper 3 Core Theory

**May/June 2017**

MARK SCHEME

Maximum Mark: 80

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**Published**

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This document consists of **10** printed pages.

| <b>Question</b> | <b>Answer</b>  | <b>Marks</b> |
|-----------------|--|--------------|
| 1(a)            | lines drawn from Enzymes to<br>are biological catalysts ;<br>are usually not active at low temperatures ;<br>are protein molecules ; | <b>3</b>     |
| 1(b)            | large / insoluble / food <u>molecules</u> are broken down ;<br>into small / soluble molecules / so they can be absorbed ;            | <b>2</b>     |
| 1(c)            | glycogen ;<br>starch ;   | <b>2</b>     |
| 1(d)(i)         | Benedict's (test) ;<br>red colour produced ;   | <b>2</b>     |
| 1(d)(ii)        | no reaction ;<br>because enzymes become inactive at high temperatures ;  | <b>2</b>     |
| 1(e)            | chlorophyll ;<br>light ;   | <b>2</b>     |

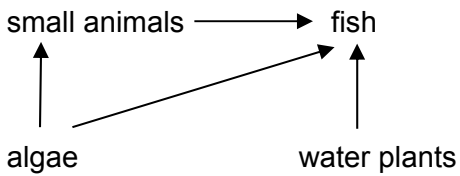
| Question  | Answer  | Marks    |
|-----------|---|----------|
| 2(a)(i)   | potassium / K<br>lithium / Li<br>sodium / Na ; ;  | <b>2</b> |
| 2(a)(ii)  | hydrogen / H <sub>2</sub> ;                       | <b>1</b> |
| 2(a)(iii) | turns blue <b>and</b><br>stays blue / no change ; | <b>1</b> |
| 2(b)(i)   | magnesium / Mg ;                                  | <b>1</b> |
| 2(b)(ii)  | copper / Cu ;                                     | <b>1</b> |
| 2(b)(iii) | (too) dangerous / (risk of) explosion ;           | <b>1</b> |
| 2(c)(i)   | resists corrosion / does not rust ;               | <b>1</b> |
| 2(c)(ii)  | stronger / does not get damaged ;                 | <b>1</b> |

| Question         | Answer  | Marks         |                    |               |          |                  |          |               |          |        |          |   |
|------------------|---|---------------|--------------------|---------------|----------|------------------|----------|---------------|----------|--------|----------|---|
| 3(a)(i)          | <table border="1"> <thead> <tr> <th>name of force</th> <th>letter on Fig. 1.1</th> </tr> </thead> <tbody> <tr> <td>driving force</td> <td><b>A</b></td> </tr> <tr> <td>frictional force</td> <td><b>C</b></td> </tr> <tr> <td>lifting force</td> <td><b>B</b></td> </tr> <tr> <td>weight</td> <td><b>D</b></td> </tr> </tbody> </table> <p>one mark for each two correct ;;</p> | name of force | letter on Fig. 1.1 | driving force | <b>A</b> | frictional force | <b>C</b> | lifting force | <b>B</b> | weight | <b>D</b> | 2 |
| name of force    | letter on Fig. 1.1  |               |                    |               |          |                  |          |               |          |        |          |   |
| driving force    | <b>A</b>  |               |                    |               |          |                  |          |               |          |        |          |   |
| frictional force | <b>C</b>  |               |                    |               |          |                  |          |               |          |        |          |   |
| lifting force    | <b>B</b>  |               |                    |               |          |                  |          |               |          |        |          |   |
| weight           | <b>D</b>  |               |                    |               |          |                  |          |               |          |        |          |   |
| 3(a)(ii)         | (Force <b>B</b> is 500 000 N) no mark<br>constant height;<br>forces ( <b>B</b> and <b>D</b> ) are balanced ;  | 1             |                    |               |          |                  |          |               |          |        |          |   |
| 3(a)(iii)        | 1. <b>A</b> / driving force ;<br>2. <b>B</b> / lifting force ;  | 2             |                    |               |          |                  |          |               |          |        |          |   |
| 3(b)(i)          | $600 \text{ km/h} = 600\,000 / 3600 \text{ m/s} = 167 \text{ m/s}$ ;  | 1             |                    |               |          |                  |          |               |          |        |          |   |
| 3(b)(ii)         | time (= distance / speed) = $2700 / 600 = 4.5 \text{ h}$  | 1             |                    |               |          |                  |          |               |          |        |          |   |
| 3(c)             | loss of kinetic energy ;<br>loss of (gravitational) potential energy ;  | 2             |                    |               |          |                  |          |               |          |        |          |   |
| 3(d)             | any variation on this shape that goes from the origin to a maximum and returns to speed = 0 ;<br>horizontal section at constant maximum speed ;   | 2             |                    |               |          |                  |          |               |          |        |          |   |

| <b>Question</b> | <b>Answer</b>   | <b>Marks</b> |
|-----------------|---|--------------|
| 4(a)(i)         | <b>A</b> closes and <b>B</b> opens ;  | <b>1</b>     |
| 4(a)(ii)        | to prevent backflow of blood ;  | <b>1</b>     |
| 4(b)(i)         | any suitable flight or fight situation described ;  | <b>1</b>     |
| 4(b)(ii)        | destroyed by the liver ;  | <b>1</b>     |
| 4(c)            | transport of oxygen / haemoglobin ;<br>transport of blood cells / ions / soluble nutrients / named soluble nutrient / hormones / carbon dioxide ; | <b>2</b>     |

| <b>Question</b> | <b>Answer</b>   | <b>Marks</b> |
|-----------------|---|--------------|
| 5(a)(i)         | Fractional distillation ;   | <b>1</b>     |
| 5(a)(ii)        | no new substance made / involves only changes of state ;                                    | <b>1</b>     |
| 5(a)(iii)       | cooking / heating <b>allow</b> bottling / bottled gas ;                                     | <b>1</b>     |
| 5(b)(i)         | methane ;   | <b>1</b>     |
| 5(b)(ii)        | (atoms) five / 5 <b>and</b><br>(elements) two / 2 ;   | <b>1</b>     |
| 5(b)(iii)       | C atom joined to 4 H atoms by single bonds ;<br><b>allow correct dot-and-cross diagrams</b> | <b>1</b>     |
| 5(c)            | coal ;  | <b>1</b>     |

| Question        | Answer   | Marks           |               |  |               |               |               |               |   |
|-----------------|--|-----------------|---------------|--|---------------|---------------|---------------|---------------|---|
| 6(a)(i)         | conduction ;   | 1               |               |  |               |               |               |               |   |
| 6(a)(ii)        | insulation (in outer layer of aircraft) / make aircraft out of bad (thermal) conductor / owtte ;   | 1               |               |  |               |               |               |               |   |
| 6(b)(i)         | <b>(Z – no mark)</b><br>gas molecules far apart / not touching ;   | 1               |               |  |               |               |               |               |   |
| 6(b)(ii)        | ice / (frozen) water ;<br>water from fuel combustion freezing / condensing in very cold air ;  | 2               |               |  |               |               |               |               |   |
| 6(c)            | <table border="1"> <tr> <td>gamma radiation</td> <td></td> <td></td> <td>visible light</td> <td></td> <td>micro-waves ;</td> <td>radio waves ;</td> </tr> </table> | gamma radiation |               |  | visible light |               | micro-waves ; | radio waves ; | 2 |
| gamma radiation |  |                 | visible light |  | micro-waves ; | radio waves ; |               |               |   |
| 6(d)            | (pitch) low ;<br>(amplitude) (very) high ;   | 2               |               |  |               |               |               |               |   |

| Question  | Answer  | Marks |
|-----------|---|-------|
| 7(a)(i)   | for <u>respiration</u> ;  | 1     |
| 7(a)(ii)  | diffusion ;   | 1     |
| 7(a)(iii) | from the (water) plants ;   | 1     |
| 7(b)(i)   | food web completed as shown ;<br><br>arrows in the correct direction ; | 2     |
| 7(b)(ii)  | small animals ;<br>water plants / algae ;   | 2     |



| Question  | Answer   | Marks |
|-----------|--|-------|
| 8(a)(i)   | filtration ;   | 1     |
| 8(a)(ii)  | kill microbes / sterilise (water) ;  | 1     |
| 8(a)(iii) | (damp)-litmus (paper) ;<br>turns white / bleached ;  | 2     |
| 8(b)(i)   | <div style="display: flex; align-items: center; justify-content: center;"> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;">chlorine</div> <span style="margin: 0 10px;">+</span> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;">hydrogen</div> <span style="font-size: 2em; margin: 0 10px;">→</span> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;">hydrogen chloride</div> <span style="font-size: 2em; margin: 0 10px;">;</span> </div> <p>LHS either order</p> | 1     |
| 8(b)(ii)  | covalent ;<br>share (pair of) electrons ;  | 2     |
| 8(b)(iii) | HCl ;  | 1     |
| 8(c)(i)   | anode ;  | 1     |
| 8(c)(ii)  | copper ;   | 1     |
| 8(c)(iii) | copper chloride solution / aqueous copper chloride ;   | 1     |

| <b>Question</b> | <b>Answer</b>   | <b>Marks</b> |
|-----------------|---|--------------|
| 9(a)            | correct symbols for ammeter and lamp ;<br>correct symbol for variable resistor ;<br>all shown components connected in series, any order ; | <b>3</b>     |
| 9(b)            | resistance = $V / I$ ;<br>(total resistance) = $2.4 / 0.6$ (= $4 \Omega$ ) ;<br>resistance of one lamp = $2 \Omega$ ;                     | <b>3</b>     |
| 9(c)            | (increase – no mark)<br>(total resistance less) so current increases ;  | <b>1</b>     |