

**Additional Science B**

General Certificate of Secondary Education

Unit **B721/01**: Modules B3, C3, P3 (Foundation Tier)

**Mark Scheme for June 2013**

---

OCR (Oxford Cambridge and RSA) is a leading UK awarding body, providing a wide range of qualifications to meet the needs of candidates of all ages and abilities. OCR qualifications include AS/A Levels, Diplomas, GCSEs, Cambridge Nationals, Cambridge Technicals, Functional Skills, Key Skills, Entry Level qualifications, NVQs and vocational qualifications in areas such as IT, business, languages, teaching/training, administration and secretarial skills.

It is also responsible for developing new specifications to meet national requirements and the needs of students and teachers. OCR is a not-for-profit organisation; any surplus made is invested back into the establishment to help towards the development of qualifications and support, which keep pace with the changing needs of today's society.

This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by examiners. It does not indicate the details of the discussions which took place at an examiners' meeting before marking commenced.

All examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the report on the examination.

OCR will not enter into any discussion or correspondence in connection with this mark scheme.

© OCR 2013

For answers marked by levels of response:

- a. **Read through the whole answer from start to finish**
- b. **Decide the level that best fits** the answer – match the quality of the answer to the closest level descriptor
- c. **To determine the mark within the level**, consider the following:

| Descriptor                           | Award mark                   |
|--------------------------------------|------------------------------|
| A good match to the level descriptor | The higher mark in the level |
| Just matches the level descriptor    | The lower mark in the level  |

- d. Use the **L1**, **L2**, **L3** annotations in Scoris to show your decision; do not use ticks.

Quality of Written Communication skills assessed in 6-mark extended writing questions include:

- appropriate use of correct scientific terms
- spelling, punctuation and grammar
- developing a structured, persuasive argument
- selecting and using evidence to support an argument
- considering different sides of a debate in a balanced way
- logical sequencing.

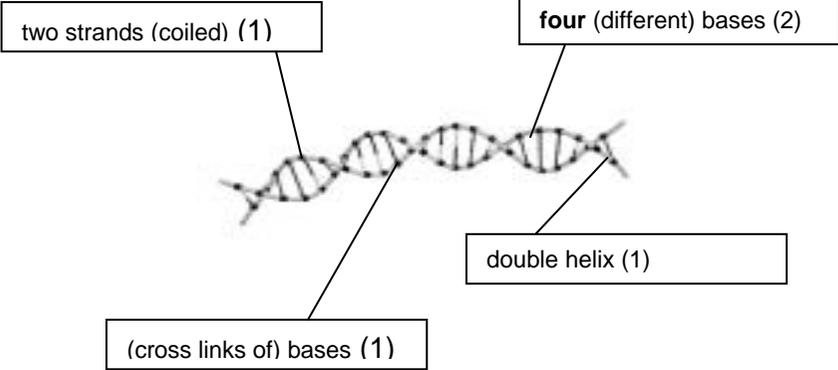
**Annotations**

| Annotation | Meaning                               |
|------------|---------------------------------------|
| ✓          | correct response                      |
| ✗          | incorrect response                    |
| [D]        | benefit of the doubt                  |
| [ND]       | benefit of the doubt <b>not</b> given |
| [CF]       | error carried forward                 |
| [A]        | information omitted                   |
| [I]        | ignore                                |
| [R]        | reject                                |
| [CON]      | contradiction                         |
| [L1]       | Level 1                               |
| [L2]       | Level 2                               |
| [L3]       | Level 3                               |

**Subject-specific Marking Instructions**

Abbreviations, annotations and conventions used in the detailed Mark Scheme.

|               |   |
|---------------|---|
| /             | = alternative and acceptable answers for the same marking point   |
| <b>(1)</b>    | = separates marking points  |
| <b>allow</b>  | = answers that can be accepted  |
| <b>not</b>    | = answers which are not worthy of credit  |
| <b>reject</b> | = answers which are not worthy of credit  |
| <b>ignore</b> | = statements which are irrelevant   |
| ( )           | = words which are not essential to gain credit  |
| —             | = underlined words must be present in answer to score a mark (although not correctly spelt unless otherwise stated) |
| ecf           | = error carried forward   |
| AW            | = alternative wording   |
| ora           | = or reverse argument   |

| Question     |     | Answer  | Marks    | Guidance  |
|--------------|-----|---|----------|---|
| 1            | (a) | nucleus (1)<br>genes (1)<br>clones (1)  | 3        |   |
|              | (b) | <b>any two from:</b><br>two strands (coiled) (1)<br>(strands coiled to form a <b>double helix</b> (1)<br>(with cross links of) bases (1)<br><b>but</b><br><b>four</b> (different) bases (2) | 2        | <p><b>allow</b> diagram drawn with one mark for each correct label</p>  <p><b>allow</b> high level answers<br/>eg (bases are) A, T, C, G (1)<br/>but has bases A, T, C, G (2)<br/><b>allow</b> idea of complementary bases (2) <b>or</b> A-T and C-G (2)<br/><b>ignore</b> incorrect pairing of bases<br/><b>ignore</b> spiral</p> |
|              | (c) | 37 (1)  | 1        | <b>not</b> 37 pairs   |
| <b>Total</b> |     |   | <b>6</b> |   |

| Question |         | Answer  | Marks | Guidance   |
|----------|---------|---|-------|--|
| 2        | (a)     | herbicide resistance <input checked="" type="checkbox"/><br>low protein content <input type="checkbox"/><br>low yield <input type="checkbox"/><br>slow growth rate <input type="checkbox"/><br>survive in drought <input checked="" type="checkbox"/>       | 2     | 2 ticks correct = 2 marks<br>2 ticks with 1 correct = 1 mark<br>1 tick correct = 1 mark<br>3 ticks with 2 correct = 1 mark<br>4 ticks with 2 correct = 0 marks<br>5 ticks with 2 correct = 0 marks   |
|          | (b) (i) | <b>more</b> food/<br><b>more</b> crops or beans or plants/<br>idea that plants can be grown in <b>more</b> places/<br>idea of grown in <b>more</b> climates/<br>less need for importing/<br>reduced famine/<br><b>more</b> nutritious food can be grown (1) | 1     | <b>allow</b> more consumers/more people can have them(1)<br><b>allow</b> more people can grow beans (1)<br><br><b>allow</b> can be grown in <b>more</b> countries/so <b>people</b> in these countries or poor climates can have beans/food/people in poor countries can have food (1)<br><b>allow</b> idea of less need for transport around the World<br><br><b>ignore</b> more money unless qualified<br>eg make more profit as grow more (1)<br><b>ignore</b> lots can be grown/grown <b>all</b> round the World<br><b>ignore</b> because the area can now grow beans (repeating the stem)<br><b>ignore</b> can be grown in a drought/grown anywhere<br><b>ignore</b> can be exported/easier to transport |

| Question | Answer   | Marks    | Guidance   |
|----------|--|----------|--|
|          | <p>(ii) <b>any two from:</b></p> <p>they may have ethical reasons (1)</p> <p>because they may harm the environment/harm biodiversity/disrupt food chains (1)</p> <p>resistance or resistant gene to pesticides or herbicides could get into other plants or could lead to increase in pesticide or herbicide use (1)</p> | 2        | <p><b>allow</b> some farmers cannot compete (1) as they cannot afford the GM seeds (1)</p> <p><b>allow</b> morally or religiously wrong (1)</p> <p><b>ignore</b> you can't fiddle with nature</p> <p><b>ignore</b> people don't like the idea of playing God</p> <p><b>allow</b> reduce biodiversity (1) because everyone grows the same crop (1)</p> <p><b>allow</b> some harmful effects may not yet have been discovered (1)</p> <p><b>allow</b> the idea that it would enable use of high levels of pesticides (1) that could lead to build up in the food chain (1)</p> <p><b>ignore</b> people will not eat it unless qualified</p> <p><b>eg</b> people will not eat it because it is not natural or organic (1)</p> <p><b>but</b> ignore they object because 'it's not natural or organic ' on its own</p> <p><b>ignore</b> may not taste as good</p> <p><b>ignore</b> idea of all susceptible to the same disease</p> <p><b>ignore</b> references to (genetic) variation or reduction of gene pool</p> |
|          | <b>Total</b>   | <b>5</b> |  |

| Question | Answer  | Marks | Guidance  |
|----------|---|-------|---|
| 3<br>(a) | <p><b>[Level 3]</b><br/>Answer correctly, identifies the complete pattern (increases, decreases, levels off) in the results <b>and</b> explains the reasons for the increase <b>or</b> decrease. Quality of written communication does not impede communication of the science at this level.<br/><b>(5–6 marks)</b></p> <p><b>[Level 2]</b><br/>Answer correctly, identifies one of the patterns (not including data) in the results <b>and</b> attempts to explain why heart rate increases <b>or</b> decreases.<br/><b>OR</b><br/>identifies the complete pattern (increases, decreases, levels off) but no explanation given<br/>Quality of written communication partly impedes communication of the science at this level.<br/><b>(3–4 marks)</b></p> <p><b>[Level 1]</b><br/>An incomplete answer, identifies one pattern in results <b>or</b> attempts to explain why heart rate increases. Quality of written communication impedes communication of the science at this level.<br/><b>(1–2 marks)</b></p> <p><b>[Level 0]</b> Insufficient or irrelevant science. Answer not worthy of credit.<br/><b>(0 marks)</b></p> | 6     | <p><b>This question is targeted at grades up to E</b><br/><b>Indicative scientific points may include:</b></p> <p><b>pattern</b></p> <ul style="list-style-type: none"> <li>• heart rate increases <b>during</b> exercise/reaches maximum</li> <li>• heart rate decreases <b>after</b> exercise</li> <li>• levels off <b>or</b> returns to normal from 16 minutes/at the end</li> <li>• dips below resting level at 14 minutes</li> <li>• recovery time of 10 minutes</li> </ul> <p><b>explains pattern on increase</b></p> <ul style="list-style-type: none"> <li>• muscles more active</li> <li>• muscles require more energy</li> <li>• muscles require more oxygen</li> <li>• muscles require more glucose</li> <li>• idea of increased blood supply to provide more oxygen</li> <li>• idea of increased blood supply to provide more glucose</li> <li>• muscles produce more carbon dioxide</li> <li>• idea of increased blood supply to remove carbon dioxide</li> <li>• mention of respiration</li> </ul> <p><b>explains pattern on decrease</b></p> <ul style="list-style-type: none"> <li>• idea that after exercise less energy/oxygen/glucose needed so heart rate falls</li> <li>• takes time to return to normal which is called the recovery time</li> </ul> <p><b>accept</b><br/>high level answers<br/>eg mentions recovery time linked to oxygen debt<br/><b>Use L1, L2, L3 annotations in scoris; do not use ticks.</b></p> |

| Question |         | Answer  | Marks    | Guidance   |
|----------|---------|---|----------|--|
|          | (b) (i) | same <b>intensity</b> of exercise/same <b>type</b> of exercise/<br>(making sure resting) pulse is same at start (1) | 1        | <b>allow</b> runs or exercises at the same speed<br><b>allow</b> (increases, decreases, levels out) pulse starts at 66 (beats per minute) each time<br><b>allow</b> same resting pulse (rate)<br><br><b>allow</b> same type footwear/clothing/weather conditions/same track  |
|          | (ii)    | his conclusion does not match results in table (1)<br><br>because recovery time in table levels off (1)             | 2        | <b>must refer to table for first mark</b><br>eg 'he is wrong' = 0<br>but he is wrong as the results do not show that = 1<br><br><b>allow</b> correct to some extent/not quite correct (1)<br><br><b>allow</b> 8 and 10 minutes are the same (1)<br><br><b>ignore</b> a description of pattern if no evaluation made<br>eg results go up then level off = 0<br><b>but</b> results go up and then level off so he is wrong = 2<br>(as he evaluates and refers to table)<br><br><b>allow</b> ideas about ways he needs to improve to help support conclusion<br>(to be sure conclusion is correct he.....)<br>needs more data (1) because 8 and 10 minutes could be anomalies (1)<br>needs to repeat investigation (1) to see if there were any anomalies (1)<br>could extend range (1) to see if pattern continues (1) |
|          |         | <b>Total</b>  | <b>9</b> |  |

| Question |     | Answer   | Marks    | Guidance   |
|----------|-----|--|----------|--|
| 4        | (a) | <p><b>any three from:</b></p> <p>rate of growth in warm room or plant A is greater/ora (1)</p> <p>enzymes work at a faster rate in warmth/ora (1)</p> <p>enzymes needed for photosynthesis (1)</p> <p>enzymes needed for mitosis (1)</p> <p>mitosis needed for growth (1)</p> <p>can photosynthesise faster/cells divide faster so more growth (1)</p> | 3        | <p><b>allow</b> plant A grows faster or grows bigger (1)</p> <p><b>allow</b> enzymes work best or at optimum in warm room or at any temperature in the range 15 – 40°C (1)</p> <p><b>ignore</b> enzymes grow or more enzymes</p> <p><b>allow</b> an implication that enzymes control the rate of photosynthesis eg the warmer the room the faster the rate of photosynthesis<br/>Enzymes act as a biological catalyst speeding up the rate (2)</p> <p><b>allow</b> enzymes <b>control</b> growth rate (1)</p> <p><b>allow</b> temperature is a limiting factor (1)</p> <p><b>allow</b> higher level answers eg enzymes required for respiration (1)<br/>eg can respire faster (in the warm room) (1)</p> |
|          | (b) | <p><b>any two from:</b></p> <p>increases the number of plants (1)</p> <p>changes the type of plants (1)</p> <p>increase the range of temperatures used <b>or</b> the number of different temperatures (1)</p>  | 2        | <p><b>allow</b> ideas about using different measurements<br/>eg measure mass (1)</p> <p><b>allow</b> idea of increasing range eg use higher/lower temperatures/temperatures other than 10 and 20 (1)</p> <p><b>allow</b> just change temperature or do one at another temperature (1)</p> <p><b>ignore</b> put plants in different conditions</p> <p><b>ignore</b> repeat experiment</p> <p><b>allow</b> more plants in different temperatures = 1</p> <p><b>but</b> more than one plant in each of a number of different temperatures = 2</p>   |
|          |     | <b>Total</b>   | <b>5</b> |  |

| Question |         | Answer  | Marks | Guidance  |
|----------|---------|---|-------|---|
| 5        | (a)     | 0.4 (grams) (1)   | 1     | <b>ignore</b> unit  |
|          | (b)     | reactant not in excess/reactant that is all used up (at the end of the reaction)/reactant that is used up first (1) | 1     | <b>ignore</b> only lasts a limited time   |
|          | (c) (i) | all points plotted correctly (1)<br><br>best curve through points (1)   | 2     | points plotted to within $\pm 0.5$ of a square<br><b>allow</b> 2 errors in plotting<br><br><b>line must go through most points</b><br><b>not</b> dot to dot<br><br>marking points are independent |
|          | (ii)    | (marble chips) are larg(er) because (rate of reaction is) slow(er) (1)  | 1     | <b>allow</b> small(er) surface area because reaction is slow(er)  |

| Question | Answer   | Marks     | Guidance  |
|----------|--|-----------|---|
| (d)      | <p><b>[Level 3]</b><br/> <b>Applies knowledge and understanding of reacting particle model to explain <u>both</u> factors in detail although the reference to more collisions may only be made for one of the factors.</b><br/>           Quality of written communication does not impede communication of the science at this level.<br/>           (5 – 6 marks)</p> <p><b>[Level 2]</b><br/> <b>Applies knowledge and understanding of reacting particle model to explain one of the factors in detail <u>or</u> partially explain both factors</b><br/>           Quality of written communication partly impedes communication of the science at this level.<br/>           (3 – 4 marks)</p> <p><b>[Level 1]</b><br/> <b>Appreciation that the rate of any reaction depends on the number of collisions in whatever context it is used</b><br/>           Quality of written communication impedes communication of the science at this level.<br/>           (1 – 2 marks)</p> <p><b>[Level 0]</b><br/>           Insufficient or irrelevant science. Answer not worthy of credit.</p> | 6         | <p><b>This question is targeted at grades up to C</b></p> <p>At all levels <b>ignore</b> reference to faster collisions and to more particles and <b>ignore</b> particles vibrate more<br/> <b>allow</b> answers that give ora but it must be very clear that this is what candidate has done</p> <p><b>Indicative scientific points at levels 2 and 3 may include:</b><br/> <u>rate increases with temperature because</u></p> <ul style="list-style-type: none"> <li>• acid particles move faster/acid particles have more energy</li> <li>• more collisions between particles of acid and marble – this does not have to be qualified eg more (successful) collisions or more collisions (per second)</li> </ul> <p><b>allow</b> – higher level answers for temperature that refer to more acid particles having sufficient energy to react or more acid particles having energy above that of the activation energy</p> <p><b>concentration of hydrochloric acid:</b></p> <ul style="list-style-type: none"> <li>• idea of more crowded acid particles/more acid particles in same volume</li> <li>• more collisions between particles of acid and marble – this does not have to be qualified eg more (successful) collisions or more collisions (per second)</li> </ul> <p><b>ignore</b> references to ‘more particles’</p> <p><b>Indicative scientific points at level 1 may include:</b></p> <ul style="list-style-type: none"> <li>• more collisions gives a faster reaction even if referring to particle size or pressure</li> <li>• link between number of collisions and rate of reaction</li> </ul> <p><b>Use L1, L2, L3 annotations in scoris; do not use ticks.</b></p> |
|          | <b>Total</b>   | <b>11</b> |   |

| Question |     | Answer   | Marks    | Guidance  |
|----------|-----|--|----------|---|
| 6        | (a) | spirit burner (1)  | 1        | allow burner<br>ignore flask/jar/lamp<br>not Bunsen burner/halogen burner   |
|          | (b) | (yes because)<br><br>fuel C gave same temperature rise as other fuels (1)<br>for <b>least/less</b> mass or fuel burned (1) | 2        | <b>marks are for explanation</b><br><br>allow temperature rise was 20°C for all fuels (1)<br>allow only 0.6g of fuel burned (1)<br>allow does not burn as much fuel (as the others) (1)<br>but ignore does not burn much fuel<br>ie answers must be comparative                   |
|          | (c) | energy given out or heat given out (1)   | 1        | allow temperature increase<br>allow heat or energy produced/made/exits/released<br>allow energy or heat is lost/makes surroundings hotter (limit of acceptability)<br>ignore gives more energy<br>not energy or heat is created<br>ignore references to bonds breaking or forming |
|          | (d) | C – 3<br>H – 8<br>O – 1  | 2        | 2 or 3 correct scores 2<br>1 correct scores 1   |
|          |     | <b>Total</b>   | <b>6</b> |   |

| Question     |         | Answer  | Marks    | Guidance  |
|--------------|---------|---|----------|---|
| 7            | (a)     | process is greener<br><br>/more atoms in reactant changed into desired product (1)  | 1        | <b>allow</b> more environmentally friendly<br><b>allow</b> less waste (biproduct)<br><br><b>allow</b> less of reactant atoms wasted<br><b>allow reaction</b> is more efficient<br><b>ignore</b> more product/ <u>higher percentage yield</u><br><b>ignore</b> improves products effectiveness/makes product work faster |
|              | (b)     | method <b>B</b> (1)<br><br>highest atom economy <b>and</b> highest percentage yield (1)   | 2        | <b>If B is not given then no marks</b><br><br><b>allow</b> answers from part (a) as alternatives to highest atom economy<br><b>allow more</b> atom economy <b>and</b> percentage yield (than the others)(1)<br><b>ignore</b> high atom economy and high percentage yield  |
|              | (c) (i) | <b>any two from:</b><br>labour/salaries/workers (1)<br>energy/electricity/gas (1)<br>testing/quality control (1)<br>time taken for development/research (1)<br>marketing (1)<br>rent/rates/taxes/insurance (1)<br>plant/buildings/machinery/equipment (1)<br>maintenance/repair/health and safety (1)<br>pollution controls (1) | 2        | <b>ignore</b> raw materials<br><br><b>allow</b> cost of temperature (1)<br><br><b>allow</b> advertising (1)<br><br><b>ignore</b> transport/packaging  |
|              | (ii)    | (extracted from) plants (1)   | 1        | <b>allow</b> correct description of extraction from plants/named plants<br><b>allow</b> animals/air/coal/water/crude oil/ <b>natural</b> gas/fossil fuels/methane   |
|              | (d)     | to make sure it works (1)<br><br>to make sure they do not have (serious) side effects/to make sure they will not harm people (1)  | 2        | <b>allow</b> it might not work(1)<br><b>allow</b> so they know the correct dosage (1)<br><br><b>allow</b> might be harmful to people (1)<br><b>allow</b> so they know the correct dosage so you don't take enough to harm you (2)   |
| <b>Total</b> |         |   | <b>8</b> |   |

| Question |     |       | Answer   | Marks    | Guidance  |
|----------|-----|-------|--|----------|---|
| 8        | (a) | (i)   | <b>B</b> (1)   | 1        |   |
|          |     | (ii)  | <b>D</b> (1)   | 1        |   |
|          |     | (iii) | <b>A and C</b> (1)   | 1        | <b>both needed either order</b>   |
|          | (b) | (i)   | 6 (.0) (m/s) (2)<br><b>but if answer is incorrect</b><br>3000 ÷ 500 (1)  | 2        | <b>allow</b> 0.006 (1)  |
|          |     | (ii)  | (idea of) speed changes (1)<br><br>(idea that) he was stationary during parts of the journey (1)<br><br><b>But</b><br>(idea that) Ravi sometimes travels above <b>average</b> and sometimes below <b>average</b> speed (2) | 2        | <b>allow</b> Ravi travelling faster for some of the time (1)<br><b>allow</b> slower for some of the time (1)<br><b>allow</b> (idea of) Ravi travelling faster <b>and</b> slower during journey (1)<br><b>allow</b> travels at different speeds (1)<br><b>allow</b> does not travel at a constant speed all the time (1)<br><b>ignore</b> he may have travelled at this speed some time<br><br><b>allow</b> he stops at traffic lights (1)<br><br><b>ignore</b> merely this (value from (b)(i)) is the average |
|          |     |       | <b>Total</b>   | <b>7</b> |   |

| Question | Answer  | Marks | Guidance   |
|----------|---|-------|--|
| 9 (a)    | <p><b>[Level 3]</b><br/> <b>Calculates rate of momentum change OR force for both with and without an airbag and comments correctly upon it.</b><br/>           Quality of written communication does not impede communication of the science at this level.<br/> <b>(5–6 marks)</b></p> <p><b>[Level 2]</b><br/> <b>Candidate makes 3 points which must be drawn from both sections A and B.</b><br/>           Quality of written communication partly impedes communication of the science at this level.<br/> <b>(3–4 marks)</b></p> <p><b>[Level 1]</b><br/> <b>Candidate makes any two points from sections A and B.</b><br/>           Quality of written communication impedes communication of the science at this level.<br/> <b>(1–2 marks)</b></p> <p><b>[Level 0]</b><br/>           Insufficient or irrelevant science. Answer not worthy of credit.<br/> <b>(0 marks)</b></p> | 6     | <p><b>This question is targeted at grades up to C</b><br/> <b>Indicative scientific points may include:</b><br/> <b>A: fundamental ideas:</b></p> <ul style="list-style-type: none"> <li>• airbag changes shape</li> <li>• airbag absorbs energy (<b>ignore</b> absorbs force)</li> <li>• reduced or no injuries in a collision or crash</li> <li>• deflates after stopping to stop suffocation</li> <li>• increase stopping or collision distance</li> <li>• less force (exerted on driver)</li> <li>• collision lasts for a longer time with airbag/ora</li> <li>• <b>driver</b> takes longer to stop</li> </ul> <p><b>ignore</b> any mention of impact or slowing down time for impact</p> <p><b>B: use of table data:</b></p> <ul style="list-style-type: none"> <li>• collision time longer with airbag</li> <li>• longer time to absorb energy</li> </ul> <p><b>C: calculations and comments needed for level 3:</b></p> <ul style="list-style-type: none"> <li>• momentum change to work out force without airbag = <math>\frac{15 \times 50}{37500}</math> (N)<br/>0.02</li> <li>• momentum change to work out force with airbag = <math>\frac{15 \times 50}{15000}</math> (N)<br/>0.05</li> <li>• Use <math>F=ma</math> to calculate force for each <math>\frac{15 \times 50}{37500}</math> (N)               <ul style="list-style-type: none"> <li>▪ 0.02</li> </ul> </li> <li>• and <math>\frac{15 \times 50}{15000}</math> (N)<br/>0.05</li> <li>• clear implication of calculations in qualitative form eg same momentum change in shorter time.</li> <li>• less force on driver with airbag or rate of change of momentum is less</li> <li>• less force over longer time with airbag/ora</li> </ul> |

| Question | Answer | Marks | Guidance   |
|----------|--------|-------|--|
|          |        |       | <ul style="list-style-type: none"><li>• leads to less force on driver/ora</li></ul> <p><b>allow</b> incorrect calculation of force as 750 (N) and 300 (N) with correct comment scores 5 marks.</p> <p><b>allow</b> idea of reduced acceleration with airbag.</p> <p><b>Use L1, L2, L3 annotations in scoris; do not use ticks.</b></p> |

| Question |     | Answer   | Marks    | Guidance  |
|----------|-----|--|----------|---|
|          | (b) | <p><b>any two from:</b><br/>           (idea of) difficult to get out of car (in an emergency) (1)</p> <p>(idea of) injury caused by seatbelt in crash or collision or impact eg, chest/neck injury (1)</p> <p>(idea of) poor driving if driver thinks they are protected in a crash or collision or impact (1)</p> <p>evidence from tests and crashes not trusted (by public/drivers)/more evidence or tests needed (1)</p> | 2        | <p><b>allow</b> might get trapped/stuck (1)</p> <p><b>allow</b> could strangle you/idea of hurting when it gets wrapped around the neck (1)</p> <p><b>ignore</b> of uncomfortable/cause injury while driving</p> <p><b>allow</b> restricts movement (while driving) (1)</p> |
|          |     | <b>Total</b>   | <b>8</b> |   |

| Question |     |      | Answer   | Marks    | Guidance  |
|----------|-----|------|--|----------|---|
| 10       | (a) | (i)  | 3978 (J) (2)<br><br><b>but if answer is incorrect</b><br><br>510 x 7.8 (1)   | 2        | <b>allow</b> 4947 (1)   |
|          |     | (ii) | kinetic/ke/KE (1)<br><br>gravitational potential/GPE/gpe/ge/potential (1)  | 2        | <b>ignore</b> k on its own<br><b>allow</b> movement/moving (1)<br><br><b>allow</b> just gravitational (1) |
|          | (b) |      | Twice as much work was done during the second escalator journey. <input checked="" type="checkbox"/><br><br>The same amount of work was done during the second escalator journey. <input type="checkbox"/><br><br>Half as much work was done during the second escalator journey. <input type="checkbox"/> | 1        | <b>more than one tick scores 0</b>  |
|          |     |      | <b>Total</b>   | <b>5</b> |   |

| Question | Answer   | Marks    | Guidance  |
|----------|--|----------|---|
| 11 (a)   | <p>(idea that) between <b>A</b> and <b>B</b> or idea that weight/gravity is pulling it <b>down</b> (1)</p> <p>(idea that) between <b>A</b> and <b>B</b> there (is also) drag/air resistance/friction (1)</p> <p><b>But</b><br/>speeds up between <b>A</b> and <b>B</b> because gravity pulling <b>down</b> is <b>greater</b> than air resistance drag/air (2)</p> <p>between <b>B</b> and <b>C</b> forces balanced (1)</p> | 3        | <p><b>ignore</b> mass</p> <p><b>ignore</b> between <b>A</b> and <b>B</b> gravity force is greater</p> <p><b>allow</b> between <b>A</b> and <b>B</b> gravity force greater than air resistance (1)</p> <p><b>ignore</b> upthrust</p> <p><b>ignore</b> resistance on its own</p> <p><b>allow</b> between <b>B</b> and <b>C</b> weight/gravity = drag/air resistance/friction (1)</p> <p><b>allow</b> upward force = downward force (1)</p> <p><b>ignore</b> forces are the same unless forces named elsewhere in answer</p> <p><b>IF A, B or C are not mentioned then allow descriptions of the correct sections of the graph.</b><br/>eg at the start gravity is pulling it down (1) then the forces become balanced (1)</p> |
| (b)      | <p>There is no gravity on the Moon. <input type="checkbox"/></p> <p>There is no atmosphere on the Moon. <input checked="" type="checkbox"/></p> <p>Objects have no weight on the Moon. <input type="checkbox"/></p> <p>There is no drag as the object falls. <input checked="" type="checkbox"/></p> <p>More drag is produced as the object falls. <input type="checkbox"/></p>  | 2        | <p>2 ticks correct = 2 marks</p> <p>2 ticks with 1 correct = 1 mark</p> <p>1 tick correct = 1 mark</p> <p>3 ticks with 2 correct = 1 mark</p> <p>4 ticks with 2 correct = 0 marks</p> <p>5 ticks with 2 correct = 0 marks</p>   |
|          | <b>Total</b>   | <b>5</b> |   |

**OCR (Oxford Cambridge and RSA Examinations)**  
1 Hills Road  
Cambridge  
CB1 2EU

**OCR Customer Contact Centre**

**Education and Learning**

Telephone: 01223 553998

Facsimile: 01223 552627

Email: [general.qualifications@ocr.org.uk](mailto:general.qualifications@ocr.org.uk)

**[www.ocr.org.uk](http://www.ocr.org.uk)**

For staff training purposes and as part of our quality assurance programme your call may be recorded or monitored

Oxford Cambridge and RSA Examinations  
is a Company Limited by Guarantee  
Registered in England  
Registered Office; 1 Hills Road, Cambridge, CB1 2EU  
Registered Company Number: 3484466  
OCR is an exempt Charity

OCR (Oxford Cambridge and RSA Examinations)  
Head office  
Telephone: 01223 552552  
Facsimile: 01223 552553

© OCR 2013

