

# **Applied Science (Double Award)**

General Certificate of Secondary Education **GCSE 1497**

## **Mark Schemes for the Units**

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**June 2007**

**1497/MS/R/07**

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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.

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**General Certificate of Secondary Education**

**GCSE Applied Science (Double Award) 1497**

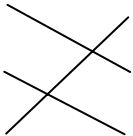
### MARK SCHEMES FOR THE UNITS

| <b>Unit</b> | <b>Content</b>                                     | <b>Page</b> |
|-------------|--|-------------|
| 4882/01     | Science for the Needs of Society (Foundation Tier) | 1           |
| 4882/02     | Science for the Needs of Society (Higher Tier)     | 9           |
| *           | Grade Thresholds                                   | 18          |



**Mark Scheme 4882/01**  
**June 2007**

| Question     | Expected Answers   | Mks         | Additional Guidance |
|--------------|--|-------------|---------------------|
| 1 a          | convection;<br>radiation;<br>conduction;   | 1<br>1<br>1 |                     |
| b            | any three from<br>(cavity) wall insulation;<br>double glazing / curtains;<br>loft / roof insulation;<br>draft excluders / close doors / close windows;<br>carpets (on floor) / underlay; | 3 max       | IGNORE tiles        |
| c            | less energy needed / less heat used / heating can be turned off;<br>need less fuel;<br>cost of fuel less / reduced;  | 2 max       | NOT fuel price drop |
| d            | does not add to global warming;<br>renewable;  | 1<br>1      |                     |
| <b>Total</b> |  | <b>10</b>   |                     |

| Question     | Expected Answers  | Mks      | Additional Guidance                  |
|--------------|---|----------|--------------------------------------|
| 2 a i        |  | 2        | all 3 correct = 2<br>1/2 correct = 1 |
| a ii         | (glazed floor) tiles;   | 1        | IGNORE ceramic                       |
| b            | lighter;<br>easier to fit;<br>doesn't need varnishing;                            | any 2    |                                      |
| <b>Total</b> |   | <b>5</b> |                                      |

| Question     | Expected Answers  | Mks                 | Additional Guidance   |
|--------------|---|---------------------|---|
| 3 a          | 60;<br>(ALLOW 58-62)<br>per minute;<br><br>OR<br>1;<br>per second   | 2                   | 'slower' = 1 mark   |
| b            | to body;<br><br>to lungs; from lungs;   | 1<br><br>2          |   |
| c i          | red blood cell labelled;  | 1                   |   |
| c ii         | fights infection / disease / infection / microorganism<br>/ engulfs bacteria / creates antibodies;<br><br>carries oxygen;<br><br>clots blood; | 1<br><br>1<br><br>1 |   |
| d i          | diabetes;   | 1                   |   |
| d ii         | diet;<br><br>insulin;   | 1<br><br>1          |   |
| d iii        | reduce blood glucose / use up glucose / reduce<br>weight / prevent stroke / heart attack / reduce<br>effects of diabetes;                     | 1                   | IGNORE glucose<br>produces energy /<br>fitness<br>sugar = glucose |
| <b>Total</b> |   | <b>13</b>           |   |



| Question     | Expected Answers  | Mks      | Additional Guidance                                 |
|--------------|---|----------|---|
| 4 a          | gives out energy / heat;  | 1        | ACCEPT raises temp / gets hot                       |
| b            | TFT   | 2        | all 3 correct= 2<br>2/1 correct = 1                 |
| c            | electrons;<br>nucleus;<br>protons;       in either<br>neutrons;       order | 3        | all 4 correct = 3<br>2/3 correct =2<br>1 correct =1 |
| <b>Total</b> |   | <b>6</b> |   |

| Question     | Expected Answers   | Mks       | Additional Guidance                       |
|--------------|--|-----------|---|
| 5 a i        | ① lower wattage / lower power;<br>② costs less for electricity / uses less electricity / energy / more efficient;<br>③ uses solar energy;<br>④ solar energy is free;   | 2         |   |
| a ii         | longer life bulbs / LED / quotes numbers;<br>so need replacing less often;<br>identifies labour cost;<br>cost of bulbs;<br>maintenance of electricity supply mentioned;  | any 2     | NEUTRAL 'they' or 'the signs last longer' |
| b            | variable light idea e.g. not always sunny;<br>batteries store charge / energy / electricity;<br>so energy available when needed;   | 2         |   |
| c i          | electrical / electricity   | 1         |   |
| c ii         | diagram with labels heat, light;<br>light MUCH BIGGER than heat output;  | 2         |   |
| d            | solar is renewable;<br>electricity is generated from fossil fuels / named fuel;<br>which is non-renewable / finite supply;<br>(burning fossil fuels) causes global warming / acid rain / named environment effect;<br>electricity produces carbon dioxide / sulfur dioxide / SO <sub>x</sub> / nitrogen oxides / NO <sub>x</sub> ;<br>stay on in power cuts; | any 3     |   |
| <b>Total</b> |  | <b>12</b> |   |

| Question     | Expected Answers   | Mks       | Additional Guidance        |
|--------------|--|-----------|----------------------------|
| <b>6 a</b>   | radiation;<br><br>causes specific health problems e.g. cancer / infertility / mutations / <u>waste</u> is toxic;<br><br>security risk;<br><br>active for many years;<br><br>disposal problem e.g. where to store it; | <b>2</b>  | 'harmful' alone not enough |
| <b>b i</b>   | oxidised   | <b>1</b>  |                            |
| <b>b ii</b>  | reduced  | <b>1</b>  |                            |
| <b>b iii</b> | correct ref to gains oxygen / loses oxygen;  | <b>1</b>  | ACCEPT reacts with oxygen  |
| <b>c</b>     | C;<br><br>Pb and CO <sub>2</sub> ;<br><br>balanced 2Pb;  | <b>3</b>  |                            |
| <b>d</b>     | carbon is non-metal;<br><br>lead is metal;<br><br>lead oxide and carbon dioxide are compounds;   | <b>3</b>  |                            |
| <b>e i</b>   | below <u>350</u> (°C)  | <b>1</b>  |                            |
| <b>e ii</b>  | above <u>350</u> (°C)  | <b>1</b>  |                            |
| <b>Total</b> |  | <b>13</b> |                            |

| Question     | Expected Answers   | Mks       | Additional Guidance  |
|--------------|--|-----------|--|
| 7 a i        | nucleus;   | 1         |  |
| a ii         | body cell / DNA;   | 1         |  |
| a iii        | DNA (from champion);   | 1         |  |
| a iv         | 2 years;   | 1         |  |
| a v          | both the same;   | 1         |  |
| b            | C;<br>S;<br>C;<br>S;<br>S;   | 3 max     | 5 correct = 3<br>3/4 correct = 2<br>2 correct = 1<br>1 correct = 0 |
| c            | balanced argument / at least one for, one against<br><br>valid argument for:<br>e.g. choose desired characteristics;<br><br>eliminate certain diseases / provide parts for transplants;<br><br>valid argument against;<br>e.g. religious / moral objections;<br><br>only available to the wealthy;<br><br>threat to / depletion of the gene pool / less variation; | 3 max     | IGNORE arguments suggesting identity with clone                    |
| <b>Total</b> |  | <b>11</b> |  |

Paper total = 70

**Mark Scheme 4882/02**  
**June 2007**

| Question     | Expected Answers   | Mks                 | Additional Guidance                              |
|--------------|--|---------------------|--|
| 1 a          | 60;<br>(ALLOW 58-62)<br>per minute;<br><br>OR<br>1;<br>per second  | 2                   | 'slower' = 1 mark                                |
| b            | blood to body;<br><br>blood to lungs;      blood from lungs  | 1<br><br>2          |  |
| c i          | red (blood) cell labelled  | 1                   |  |
| c ii         | fights infection / disease / infection / microorganism<br>/ engulfs bacteria / creates antibodies;<br><br>carries oxygen;<br><br>clots blood   | 1<br><br>1<br><br>1 | IGNORE 'protect / prevent'<br><br>IGNORE 'germs' |
| d i          | diabetes   | 1                   |  |
| d ii         | control diet;<br><br>detail of diet: eat less sugar;<br><br>use insulin;<br><br>insulin by injection;<br><br>monitor blood sugar levels;<br><br>control blood sugar levels;<br><br>lose weight | 3                   | IGNORE exercise                                  |
| <b>Total</b> |  | <b>13</b>           |  |

| Question     | Expected Answers  | Mks       | Additional Guidance                       |
|--------------|---|-----------|---|
| 2 a i        | ① lower wattage / lower power;<br>② costs less for electricity / uses less electricity / energy / more efficient;<br>③ uses solar energy / solar panel;<br>④ solar energy is free   | 2         | 'saves energy' is too vague               |
| a ii         | longer life bulbs / LED / quotes numbers;<br>so need replacing less often;<br>identifies labour cost;<br>cost of bulbs;<br>maintenance of electricity supply mentioned  | any 2     | NEUTRAL 'they' or 'the signs last longer' |
| b            | variable light idea e.g. not always sunny;<br>batteries store charge / energy / electricity;<br>so energy available when needed   | 2         |   |
| c i          | electrical / electricity  | 1         |   |
| c ii         | diagram with labels heat, light;<br>light MUCH BIGGER than heat output;   | 2         |   |
| d            | solar is renewable / does not run out;<br>electricity is generated from fossil fuels / named fuel;<br>which is non-renewable / finite supply;<br>(burning fossil fuels) causes global warming / acid rain / named environment effect;<br>(burning fossil fuels) produces carbon dioxide / sulfur dioxide / SO <sub>x</sub> / nitrogen oxides / NO <sub>x</sub> ;<br>stay on in power cuts | any 3     |   |
| <b>Total</b> |   | <b>12</b> |   |

| Question     | Expected Answers  | Mks       | Additional Guidance   |
|--------------|---|-----------|---|
| <b>3 a</b>   | radiation;<br><br>causes specific health problems e.g. cancer / infertility / mutations / toxic;<br><br>security risk;<br><br>active for many years;<br><br>disposal problem e.g. where to store it | <b>2</b>  | 'harmful' alone not enough<br><br>'radiation poisoning' = 1 |
| <b>b i</b>   | oxidised  | <b>1</b>  |   |
| <b>b ii</b>  | reduced   | <b>1</b>  |   |
| <b>b iii</b> | correct ref to gains oxygen / loses oxygen  | <b>1</b>  | ACCEPT reacts with oxygen                                   |
| <b>c</b>     | C;<br><br>Pb and CO <sub>2</sub> ;<br><br>balanced 2Pb  | <b>3</b>  |   |
| <b>d</b>     | carbon is non-metal;<br><br>lead is metal;<br><br>lead oxide and carbon dioxide are compounds   | <b>3</b>  |   |
| <b>e i</b>   | below <u>350</u> (°C)   | <b>1</b>  |   |
| <b>e ii</b>  | above <u>350</u> (°C)   | <b>1</b>  |   |
| <b>Total</b> |   | <b>13</b> |   |



| Question     | Expected Answers  | Mks      | Additional Guidance                                |
|--------------|---|----------|--|
| 4 a          | <i>mitosis</i>  | 1        |  |
| b            | chromosome / DNA;<br>spindle / fibre  | 2        |  |
| c            | ✓<br>x<br>✓<br>✓<br>x   | 3        | all correct =3<br>4 correct = 2<br>2/3 correct = 1 |
| d            | contents of injection: weakened virus / related virus;<br>vaccines contain antigens;<br>body produces antibodies;<br>prevents future occurrence of illness;<br>recognition / memory idea;<br>antibodies produced (quickly) on reinfection;<br>role of white blood cells | 3        | IGNORE 'small amount'                              |
| <b>Total</b> |   | <b>9</b> |  |

| Question     | Expected Answers  | Mks       | Additional Guidance                     |
|--------------|---|-----------|---|
| 5 a i        | more than one material <u>joined</u> / <u>combined together</u>   | 1         | NOT just 'mixture'                      |
| a ii         | can choose properties;<br>bigger range of properties;<br>properties improvement over natural materials;<br>idea of recycling unusable waste (e.g. wood chip);<br>Up to <b>2 marks</b> for specific properties<br>e.g. stronger / harder / more durable/more flexible etc. | any 2     |   |
| b i          | both polymers / long chain molecules;<br>laminate has cross links / polyprop does not /<br><u>molecules</u> in laminate closer together / laminate has<br>a more regular structure  | 2         |   |
| b ii         | chains can move (over each other) in polyprop /<br>cannot move in laminate;<br>cross links hold chains in place / molecules held<br>together  | 2         | ACCEPT 'fibres'<br>for 'molecules'      |
| c i          | cross links;<br>no water;<br>layers closer together   | any 2     | ACCEPT 3 or<br>fewer water<br>molecules |
| c ii         | waterproof;<br>stronger / harder;<br>cannot be made soft again;<br>lighter;<br>cannot change shape / not malleable  | any 2     |   |
| <b>Total</b> |   | <b>11</b> |   |

| Question     | Expected Answers  | Mks          | Additional Guidance |
|--------------|---|--------------|---------------------|
| <b>6 a i</b> | X directly above engine   | <b>1</b>     |                     |
| <b>a ii</b>  | idea of coolant flowing through exchanger / in and out;<br>heat transfer to coolant;<br>by conduction;<br>coolant heats up in engine block;<br>hot coolant flows to car heater;<br>air removes heat from coolant;<br>hot air enters car;<br>by convection | <b>any 3</b> |                     |
| <b>b</b>     | good conductor (of heat);<br>high melting point / doesn't melt / withstands high temperatures;<br>malleability / easily shaped;<br>not brittle / does not crack;<br>durable/strong;<br>heats up quickly   | <b>2</b>     |                     |
| <b>c</b>     | conduction, convection and radiation (all three needed)   | <b>1</b>     |                     |
| <b>d i</b>   | 2400 x 200 (1)<br>÷ 1000 = 480 (kJ)   | <b>2</b>     |                     |

| Question     | Expected Answers   | Mks       | Additional Guidance |
|--------------|--|-----------|---------------------|
| 6 d ii       | max 2 from<br>water: corrodes engine;<br>freezes more easily;<br>idea of winter temperatures very low;<br><br>max 2 from<br>antifreeze: low specific heat capacity/heats up<br>quickly;<br>explained e.g. does not cool engine as efficiently /<br>engine may overheat;<br>has a lower boiling point OWTTE | max 3     |                     |
| <b>Total</b> |  | <b>12</b> |                     |

| Question     | Expected Answers   | Mks       | Additional Guidance                   |
|--------------|--|-----------|---------------------------------------|
| 7 a          | 39 %   | 1         |                                       |
| b i          | carbon dioxide decreases / falls;<br>gas X increases / rises;<br>quotes numbers from table | any 2     |                                       |
| b ii         | nitrogen;<br>78 % in atmosphere / other main gas in atmosphere                             | 2         |                                       |
| c i          | increases it / give out oxygen   | 1         | NOT 'breathes out oxygen'             |
| c ii         | photosynthesis   | 1         |                                       |
| d i          | animals need food (from plants);<br>and oxygen   | 2         |                                       |
| d ii         | CO <sub>2</sub> made by animals / respiration;<br>used by plants / photosynthesis          | 2         | NOT 'breathes in /out carbon dioxide' |
| <b>Total</b> |  | <b>11</b> |                                       |

**General Certificate of Secondary Education  
Applied Science (Double Award) 1497  
June 2007 Assessment Series**

**Unit Threshold Marks**

| Unit   |     | Maximum Mark | A*  | A   | B   | C  | D  | E  | F   | G   | U   |
|--------|-----|--------------|-----|-----|-----|----|----|----|-----|-----|-----|
| 4881   | Raw | 50           | 46  | 42  | 38  | 35 | 28 | 22 | 16  | 10  | 0   |
|        | UMS | 100          | 90  | 80  | 70  | 60 | 50 | 40 | 30  | 20  | 0   |
| 4882/1 | Raw | 70           | n/a | n/a | n/a | 39 | 32 | 25 | 18  | 11  | 0   |
|        | UMS | 69           | n/a | n/a | n/a | 60 | 50 | 40 | 30  | 20  | 0   |
| 4882/2 | Raw | 70           | 50  | 42  | 34  | 26 | 16 | 11 | n/a | n/a | n/a |
|        | UMS | 100          | 90  | 80  | 70  | 60 | 50 | 40 | n/a | n/a | n/a |
| 4883   | Raw | 50           | 47  | 43  | 39  | 35 | 29 | 23 | 17  | 11  | 0   |
|        | UMS | 100          | 90  | 80  | 70  | 60 | 50 | 40 | 30  | 20  | 0   |

**Entry Information**

| Unit   | Total Entry |
|--------|-------------|
| 4881   | 8564        |
| 4882/1 | 4586        |
| 4882/2 | 1694        |
| 4883   | 11479       |

**Specification Aggregation Results**

| GRADE | A*A* | AA  | BB   | CC   | DD   | EE   | FF   | GG   | UU    |
|-------|------|-----|------|------|------|------|------|------|-------|
| UMS   | 270  | 240 | 210  | 180  | 150  | 120  | 90   | 60   | 0     |
| Cum % | 0.3  | 2.3 | 11.6 | 39.1 | 64.1 | 81.0 | 92.2 | 97.6 | 100.0 |

**12068 candidates were entered for aggregation this series**

For a description of how UMS marks are calculated see;  
[http://www.ocr.org.uk/exam\\_system/understand\\_ums.html](http://www.ocr.org.uk/exam_system/understand_ums.html)

Statistics are correct at the time of publication



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