

# Mark scheme June 2004

## GCSE

## Science (Modular) Double Award and Physics

### Module 09

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#### **Energy: Foundation Tier**

| One1 - kettle<br>2 - torch<br>3 - food mixer<br>4 - radioTwo1 - radiation<br>2 - insulation<br>3 - convection<br>4 - conductionThree1 - wind farms<br>2 - hydroelectric schemes<br>3 - goothermal schemes<br>4 - solar cellsFour1 - fossil fuels<br>2 - hydroelectric schemes<br>3 - wind farms<br>4 - nuclear fuelsFour1 - fossil fuels<br>2 - hydroelectric schemes<br>3 - wind farms<br>4 - nuclear fuelsFour1 - fossil fuels<br>2 - hydroelectric schemes<br>3 - wind farms<br>4 - nuclear fuelsFive1 - water flows through the sluice gates<br>2 - water is trapped behind the barrage<br>3 - water flows through the turbo-generators<br>4 - electricity is supplied to the National GridFive1 - water flows through the sluice son a satellite<br>there is an almost continuous supply of solar energy in spaceSixit is not practical to replace batteries on a satellite<br>there is an almost continuous supply of solar energy in spaceSeventhey are usually built in mountainous areas<br>they can be used in reverse to store energy from surplus electricityFine9.1 - D, 8.2 - A, 8.3 - B, 8.4 - BNine9.1 - D, 9.2 - B, 9.3 - A, 9.4 - CTen10.1 - D, 10.2 - B, 10.3 - A, 10.4 - D | Question<br>No. | KEY  |
|--|-----------------|--|
| 2 - torch<br>$3 - food mixer$<br>$4 - radio$ Two $1 - radiation$<br>$2 - insulation$<br>   | One             | 1 – kettle   |
| 3 - food mixer   4 - radio   Two 1 - radiation   2 - insulation   3 - convection   4 - conduction   Three 1 - wind farms   2 - hydroelectric schemes   3 - geothermal schemes   4 - solar cells   Four 1 - fossil fuels   2 - hydroelectric schemes   3 - wind farms   4 - nuclear fuels   Four 1 - fossil fuels   2 - hydroelectric schemes   3 - wind farms   4 - nuclear fuels   2   water flows through the sluice gates   2 - water is trapped behind the barrage   3 - water flows through the turbo-generators   4 - electricity is supplied to the National Grid   Six it is not practical to replace batteries on a satellite   there is an almost continuous supply of solar energy in space   Seven they are usually built in mountainous areas   they can be used in reverse to store energy from surplus electricity   Eight 8.1 - D, 8.2 - A, 8.3 - B, 8.4 - B   There 10.1 - D, 10.2 - B, 10.3 - A, 10.4 - D  |                 | 2 – torch  |
| 4 - radio   Two 1 - radiation   2 - insulation   3 - convection   4 - conduction   Three 1 - wind farms   2 - hydroelectric schemes   3 - goothermal schemes   4 - solar cells   Four 1 - fossil fuels   2 - hydroelectric schemes   3 - wind farms   4 - nuclear fuels   Five 1 - water flows through the sluice gates   2 - water is trapped behind the barrage   3 - water flows through the turbo-generators   4 - electricity is supplied to the National Grid   Six it is not practical to replace batteries on a satellite there is an almost continuous supply of solar energy in space   Seven they are usually built in mountainous areas they can be used in reverse to store energy from surplus electricity   Eight 8.1 - D, 8.2 - A, 8.3 - B, 8.4 - B   Mine 9.1 - D, 9.2 - B, 9.3 - A, 9.4 - C   Ten 10.1 - D, 10.2 - B, 10.3 - A, 10.4 - D   |                 | 3 – food mixer   |
| Two $1 - radiation$<br>$2 - insulation3 - convection4 - conductionThree1 - wind farms2 - hydroelectric schemes3 - geothermal schemes4 - solar cellsFour1 - fossil fuels2 - hydroelectric schemes3 - wind farms4 - nuclear fuelsFour1 - fossil fuels2 - hydroelectric schemes3 - wind farms4 - nuclear fuelsFive1 - water flows through the sluice gates2 - water is trapped behind the barrage3 - water flows through the turbo-generators4 - electricity is supplied to the National GridSixit is not practical to replace batteries on a satellitethere is an almost continuous supply of solar energy in spaceSeventhey are usually built in mountainous areasthey can be used in reverse to store energy from surplus electricityEight8.1 - D, 8.2 - A, 8.3 - B, 8.4 - BMine9.1 - D, 9.2 - B, 9.3 - A, 9.4 - CTen10.1 - D, 10.2 - B, 10.3 - A, 10.4 - D$   |                 | 4 – radio  |
| Two $1 - radiation$<br>$2 - insulation$<br>$3 - convection$<br>$4 - conductionThree1 - wind farms2 - hydroelectric schemes3 - geothermal schemes4 - solar cellsThree1 - wind farms2 - hydroelectric schemes3 - geothermal schemes4 - solar cellsFour1 - fossil fuels2 - hydroelectric schemes3 - wind farms4 - nuclear fuelsFour1 - fossil fuels2 - hydroelectric schemes3 - wind farms4 - nuclear fuelsFive1 - water flows through the sluice gates2 - water is trapped behind the barrage3 - water flows through the turbo-generators4 - electricity is supplied to the National GridSixit is not practical to replace batteries on a satellitethere is an almost continuous supply of solar energy in spaceSeventhey are usually built in mountainous areasthey can be used in reverse to store energy from surplus electricityEight8.1 - D, 8.2 - A, 8.3 - B, 8.4 - BTen10.1 - D, 10.2 - B, 10.3 - A, 10.4 - D$  |                 |  |
| 2 - insulation   3 - convection   4 - conduction   Three   1 - wind farms   2 - hydroelectric schemes   3 - geothermal schemes   4 - solar cells   Four   1 - fossil fuels   2 - hydroelectric schemes   3 - wind farms   4 - nuclear fuels   Five   1 - water flows through the sluice gates   2 - water is trapped behind the barrage   3 - wiref flows through the turbo-generators   4 - electricity is supplied to the National Grid   Six   it is not practical to replace batteries on a satellite   there is an almost continuous supply of solar energy in space   Seven they are usually built in mountainous areas   they can be used in reverse to store energy from surplus electricity   Eight 8.1 - D, 8.2 - A, 8.3 - B, 8.4 - B   Mine 9.1 - D, 9.2 - B, 9.3 - A, 9.4 - C   Ten 10.1 - D, 10.2 - B, 10.3 - A, 10.4 - D   | Two             | 1 – radiation  |
| 3 - convection   4 - conduction   Three 1 - wind farms   2 - hydroelectric schemes   3 - geothermal schemes   4 - solar cells   Four 1 - fossil fuels   2 - hydroelectric schemes   3 - wind farms   4 - nuclear fuels   Five 1 - water flows through the sluice gates   2 - water is trapped behind the barrage   3 - water flows through the turbo-generators   4 - electricity is supplied to the National Grid   Six it is not practical to replace batteries on a satellite there is an almost continuous supply of solar energy in space   Seven they are usually built in mountainous areas they can be used in reverse to store energy from surplus electricity   Eight 8.1 - D, 8.2 - A, 8.3 - B, 8.4 - B   Nine 9.1 - D, 9.2 - B, 9.3 - A, 9.4 - C   Ten 10.1 - D, 10.2 - B, 10.3 - A, 10.4 - D  |                 | 2 – insulation   |
| 4 - conduction   Three 1 - wind farms   2 - hydroelectric schemes 3 - geothermal schemes   4 - solar cells 4 - solar cells   Four 1 - fossil fuels   2 - hydroelectric schemes 3 - wind farms   4 - nuclear fuels 4 - nuclear fuels   Five 1 - water flows through the sluice gates   2 - water is trapped behind the barrage 3 - water flows through the turbo-generators   4 - electricity is supplied to the National Grid 4 - electricity is supplied to the National Grid   Six it is not practical to replace batteries on a satellite there is an almost continuous supply of solar energy in space   Seven they are usually built in mountainous areas they can be used in reverse to store energy from surplus electricity   Eight 8.1 - D, 8.2 - A, 8.3 - B, 8.4 - B   Mine 9.1 - D, 9.2 - B, 9.3 - A, 9.4 - C   Ten 10.1 - D, 10.2 - B, 10.3 - A, 10.4 - D  |                 | 3 – convection   |
| Three 1 - wind farms   2 - hydroelectric schemes 3 - geothermal schemes   4 - solar cells -   Four 1 - fossil fuels   2 - hydroelectric schemes -   3 - wind farms -   4 - nuclear fuels -   Five 1 - water flows through the sluice gates   2 - water is trapped behind the barrage -   3 - water flows through the sluice gates -   2 - water is trapped behind the barrage -   3 - water flows through the sluice gates -   2 - water is trapped behind the barrage -   3 - water flows through the sluice gates through the sluice gates -   2 - water is trapped behind the barrage -   3 - water flows through the sluice gates the urbo-generators -   4 - electricity is supplied to the National Grid -   - - -   Six it is not practical to replace batteries on a satellite there is an almost continuous supply of solar energy in space   - - -   Seven they are usually built in mountainous areas they can be used in reverse to store energy from surplus electricity   - -  |                 | 4 – conduction   |
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| 2 - hydroelectric schemes   3 - geothermal schemes   4 - solar cells   Four 1 - fossil fuels   2 - hydroelectric schemes   3 - wind farms   4 - nuclear fuels   Five 1 - water flows through the sluice gates   2 - water is trapped behind the barrage   3 - water flows through the turbo-generators   4 - electricity is supplied to the National Grid   Six   it is not practical to replace batteries on a satellite   there is an almost continuous supply of solar energy in space   Seven   they are usually built in mountainous areas   they can be used in reverse to store energy from surplus electricity   Eight 8.1 - D, 8.2 - A, 8.3 - B, 8.4 - B   Ten 10.1 - D, 10.2 - B, 10.3 - A, 10.4 - D   | Three           | I – wind farms   |
| 3 - geothermal schemes   4 - solar cells   Four 1 - fossil fuels   2 - hydroelectric schemes   3 - wind farms   4 - nuclear fuels   Five   1 - water flows through the sluice gates   2 - water is trapped behind the barrage   3 - water flows through the turbo-generators   4 - electricity is supplied to the National Grid   Six   it is not practical to replace batteries on a satellite   there is an almost continuous supply of solar energy in space   Seven   they are usually built in mountainous areas   they can be used in reverse to store energy from surplus electricity   Eight 8.1 - D, 8.2 - A, 8.3 - B, 8.4 - B   Nine 9.1 - D, 9.2 - B, 9.3 - A, 9.4 - C   Ten 10.1 - D, 10.2 - B, 10.3 - A, 10.4 - D   |                 | 2 – hydroelectric schemes  |
| 4 - solar cells   Four 1 - fossil fuels   2 - hydroelectric schemes   3 - wind farms   4 - nuclear fuels   Five 1 - water flows through the sluice gates   2 - water is trapped behind the barrage   3 - water flows through the turbo-generators   4 - electricity is supplied to the National Grid   Six   it is not practical to replace batteries on a satellite   there is an almost continuous supply of solar energy in space   Seven   they are usually built in mountainous areas   they can be used in reverse to store energy from surplus electricity   Eight 8.1 - D, 8.2 - A, 8.3 - B, 8.4 - B   Nine 9.1 - D, 9.2 - B, 9.3 - A, 9.4 - C   Ten 10.1 - D, 10.2 - B, 10.3 - A, 10.4 - D  |                 | 3 – geothermal schemes   |
| Four 1 - fossil fuels   2 - hydroelectric schemes   3 - wind farms   4 - nuclear fuels   Five 1 - water flows through the sluice gates   2 - water is trapped behind the barrage   3 - water flows through the turbo-generators   4 - electricity is supplied to the National Grid   Six it is not practical to replace batteries on a satellite   there is an almost continuous supply of solar energy in space   Seven they are usually built in mountainous areas   they can be used in reverse to store energy from surplus electricity   Eight 8.1 - D, 8.2 - A, 8.3 - B, 8.4 - B   Nine 9.1 - D, 9.2 - B, 9.3 - A, 9.4 - C   Ten 10.1 - D, 10.2 - B, 10.3 - A, 10.4 - D  |                 | 4 – solar cells  |
| Four 1 – tossil fuels   2 – hydroelectric schemes 3 – wind farms   4 – nuclear fuels 4   Five 1 – water flows through the sluice gates   2 – water is trapped behind the barrage 3 – water flows through the turbo-generators   3 – electricity is supplied to the National Grid 4   Six it is not practical to replace batteries on a satellite there is an almost continuous supply of solar energy in space   Seven they are usually built in mountainous areas they can be used in reverse to store energy from surplus electricity   Eight 8.1 – D, 8.2 – A, 8.3 – B, 8.4 – B   Mine 9.1 – D, 9.2 – B, 9.3 – A, 9.4 – C   Ten 10.1 – D, 10.2 – B, 10.3 – A, 10.4 – D  | F               |  |
| 2 - hydroelectric schemes   3 - wind farms   4 - nuclear fuels   Five   1 - water flows through the sluice gates   2 - water is trapped behind the barrage   3 - water flows through the turbo-generators   4 - electricity is supplied to the National Grid   Six   it is not practical to replace batteries on a satellite there is an almost continuous supply of solar energy in space   Seven   they are usually built in mountainous areas they can be used in reverse to store energy from surplus electricity   Eight 8.1 - D, 8.2 - A, 8.3 - B, 8.4 - B   Nine 9.1 - D, 9.2 - B, 9.3 - A, 9.4 - C   Ten 10.1 - D, 10.2 - B, 10.3 - A, 10.4 - D  | Four            | 1 - 10000000000000000000000000000000000                              |
| S - wind farms   4 - nuclear fuels   Five 1 - water flows through the sluice gates   2 - water is trapped behind the barrage   3 - water flows through the turbo-generators   4 - electricity is supplied to the National Grid   Six   it is not practical to replace batteries on a satellite   there is an almost continuous supply of solar energy in space   Seven   they are usually built in mountainous areas   they can be used in reverse to store energy from surplus electricity   Eight   8.1 - D, 8.2 - A, 8.3 - B, 8.4 - B   Nine   9.1 - D, 9.2 - B, 9.3 - A, 9.4 - C   Ten   |                 | 2 – nydroelectric schemes  |
| Five 1 - water flows through the sluice gates   2 - water is trapped behind the barrage   3 - water flows through the turbo-generators   4 - electricity is supplied to the National Grid   Six   it is not practical to replace batteries on a satellite   there is an almost continuous supply of solar energy in space   Seven   they are usually built in mountainous areas   they can be used in reverse to store energy from surplus electricity   Eight   8.1 - D, 8.2 - A, 8.3 - B, 8.4 - B   Nine   9.1 - D, 9.2 - B, 9.3 - A, 9.4 - C   Ten  |                 | 5 – Wind Tarins  |
| Five1 - water flows through the sluice gates<br>2 - water is trapped behind the barrage<br>3 - water flows through the turbo-generators<br>4 - electricity is supplied to the National GridSixit is not practical to replace batteries on a satellite<br>there is an almost continuous supply of solar energy in spaceSeventhey are usually built in mountainous areas<br>they can be used in reverse to store energy from surplus electricityEight $8.1 - D, \ 8.2 - A, \ 8.3 - B, \ 8.4 - B$ Nine $9.1 - D, \ 9.2 - B, \ 9.3 - A, \ 9.4 - C$ Ten $10.1 - D, \ 10.2 - B, \ 10.3 - A, \ 10.4 - D$  |                 | 4 – nuclear lueis  |
| Five 1 - water flows through the suitce gates   2 - water is trapped behind the barrage   3 - water flows through the turbo-generators   4 - electricity is supplied to the National Grid   Six   it is not practical to replace batteries on a satellite   there is an almost continuous supply of solar energy in space   Seven   they are usually built in mountainous areas   they can be used in reverse to store energy from surplus electricity   Eight 8.1 - D, 8.2 - A, 8.3 - B, 8.4 - B   Nine 9.1 - D, 9.2 - B, 9.3 - A, 9.4 - C   Ten 10.1 - D, 10.2 - B, 10.3 - A, 10.4 - D   | Eivo            | 1 water flows through the sluige gates                               |
| 2 - water is trapped berning the barrage   3 - water flows through the turbo-generators   4 - electricity is supplied to the National Grid   Six   it is not practical to replace batteries on a satellite   there is an almost continuous supply of solar energy in space   Seven   they are usually built in mountainous areas   they can be used in reverse to store energy from surplus electricity   Eight   8.1 - D, 8.2 - A, 8.3 - B, 8.4 - B   Nine   9.1 - D, 9.2 - B, 9.3 - A, 9.4 - C   Ten   | FIVE            | 1 – water nows unough the source gates                               |
| S - water nows through the throo-generators   4 - electricity is supplied to the National Grid   Six   it is not practical to replace batteries on a satellite<br>there is an almost continuous supply of solar energy in space   Seven   they are usually built in mountainous areas<br>they can be used in reverse to store energy from surplus electricity   Eight 8.1 - D, 8.2 - A, 8.3 - B, 8.4 - B   Nine 9.1 - D, 9.2 - B, 9.3 - A, 9.4 - C   Ten 10.1 - D, 10.2 - B, 10.3 - A, 10.4 - D  |                 | 2 – water is trapped beinne the barrage                              |
| Six it is not practical to replace batteries on a satellite<br>there is an almost continuous supply of solar energy in space   Seven they are usually built in mountainous areas<br>they can be used in reverse to store energy from surplus electricity   Eight 8.1 - D, 8.2 - A, 8.3 - B, 8.4 - B   Nine 9.1 - D, 9.2 - B, 9.3 - A, 9.4 - C   Ten 10.1 - D, 10.2 - B, 10.3 - A, 10.4 - D   |                 | 5 - water nows unough the turbo-generators                           |
| Six it is not practical to replace batteries on a satellite there is an almost continuous supply of solar energy in space   Seven they are usually built in mountainous areas they can be used in reverse to store energy from surplus electricity   Eight 8.1 - D, 8.2 - A, 8.3 - B, 8.4 - B   Nine 9.1 - D, 9.2 - B, 9.3 - A, 9.4 - C   Ten 10.1 - D, 10.2 - B, 10.3 - A, 10.4 - D   |                 |  |
| Six It is not practical to reprace batteries on a saterine<br>there is an almost continuous supply of solar energy in space   Seven they are usually built in mountainous areas<br>they can be used in reverse to store energy from surplus electricity   Eight 8.1 - D, 8.2 - A, 8.3 - B, 8.4 - B   Nine 9.1 - D, 9.2 - B, 9.3 - A, 9.4 - C   Ten 10.1 - D, 10.2 - B, 10.3 - A, 10.4 - D  | Siv             | it is not practical to replace batteries on a satellite              |
| Seven they are usually built in mountainous areas<br>they can be used in reverse to store energy from surplus electricity   Eight 8.1 - D, 8.2 - A, 8.3 - B, 8.4 - B   Nine 9.1 - D, 9.2 - B, 9.3 - A, 9.4 - C   Ten 10.1 - D, 10.2 - B, 10.3 - A, 10.4 - D  | SIX             | there is an almost continuous supply of solar energy in space        |
| Seventhey are usually built in mountainous areas<br>they can be used in reverse to store energy from surplus electricityEight $8.1 - D, 8.2 - A, 8.3 - B, 8.4 - B$ Nine $9.1 - D, 9.2 - B, 9.3 - A, 9.4 - C$ Ten10.1 - D, 10.2 - B, 10.3 - A, 10.4 - D   |                 | there is an annost continuous suppry of solar energy in space        |
| SevenIncy are usually built in mountainous areas<br>they can be used in reverse to store energy from surplus electricityEight $8.1 - D, 8.2 - A, 8.3 - B, 8.4 - B$ Nine $9.1 - D, 9.2 - B, 9.3 - A, 9.4 - C$ Ten10.1 - D, 10.2 - B, 10.3 - A, 10.4 - D   | Seven           | they are usually built in mountainous areas                          |
| Eight $8.1 - D, 8.2 - A, 8.3 - B, 8.4 - B$ Nine $9.1 - D, 9.2 - B, 9.3 - A, 9.4 - C$ Ten $10.1 - D, 10.2 - B, 10.3 - A, 10.4 - D$  | Seven           | they can be used in reverse to store energy from surplus electricity |
| Eight $8.1 - D$ , $8.2 - A$ , $8.3 - B$ , $8.4 - B$ Nine $9.1 - D$ , $9.2 - B$ , $9.3 - A$ , $9.4 - C$ Ten $10.1 - D$ , $10.2 - B$ , $10.3 - A$ , $10.4 - D$   |                 |  |
| Nine $9.1 - D, 9.2 - B, 9.3 - A, 9.4 - C$<br>Ten $10.1 - D, 10.2 - B, 10.3 - A, 10.4 - D$  | Eight           | 81-D 82-A 83-B 84-B  |
| Nine $9.1 - D, 9.2 - B, 9.3 - A, 9.4 - C$<br>Ten $10.1 - D, 10.2 - B, 10.3 - A, 10.4 - D$  | 21911           |  |
| Ten $10.1 - D$ , $10.2 - B$ , $10.3 - A$ , $10.4 - D$  | Nine            | 9.1 - D. 9.2 - B. 9.3 - A. 9.4 - C                                   |
| Ten $10.1 - D$ , $10.2 - B$ , $10.3 - A$ , $10.4 - D$  |                 |  |
|  | Ten             | 10.1 – D, 10.2 – B, 10.3 – A, 10.4 – D                               |

### **Energy: Higher Tier**

| Question<br>No. | КЕҮ  |
|-----------------|--|
| One             | 1 – water flows through the sluice gates                             |
|                 | 2 – water is trapped behind the barrage                              |
|                 | 3 – water flows through the turbo-generators                         |
|                 | 4 – electricity is supplied to the National Grid                     |
|                 |  |
| Two             | 1 – nuclear  |
|                 | 2 - wind   |
|                 | 3 - coal   |
|                 | 4 – solar  |
| -               |  |
| Three           | they are usually built in mountainous areas                          |
|                 | they can be used in reverse to store energy from surplus electricity |
|                 |  |
| Four            | changes in density result in energy transfer                         |
|                 | warm regions expand and rise   |
| -               |  |
| Five            | 5.1 – D, 5.2 – A, 5.3 – B, 5.4 – B                                   |
|                 |  |
| Six             | 6.1 – D, 6.2 – B, 6.3 – A, 6.4 – C                                   |
|                 |  |
| Seven           | 7.1 – D, 7.2 – B, 7.3 – A, 7.4 – D                                   |
|                 |  |
| Eight           | 8.1 - C, 8.2 - A, 8.3 - A, 8.4 - B                                   |
|                 |  |
| Nine            | 9.1 - C, 9.2 - B, 9.3 - C, 9.4 - C                                   |
|                 |  |
| Ten             | 10.1 – B, 10.2 – C, 10.3 – D, 10.4 – D                               |