| Q | Marking instructions | AO | Marks | Typical solution |
|---|---|---|---|---|
| **11(a)(i)** | States 20 °C<br>Condone missing units | 3.3 | B1 | 20 °C |
| | **Subtotal** | | **1** | |

| Q | Marking instructions | AO | Marks | Typical solution |
|---|---|---|---|---|
| **11(a)(ii)** | States 1100 °C<br>Condone missing units | 3.3 | B1 | 1100 °C |
| | **Subtotal** | | **1** | |

| Q | Marking instructions | AO | Marks | Typical solution |
|---|---|---|---|---|
| **11(b)(i)** | Substitutes $t = 1$ and $\theta = 375$ into the model | 3.1b | B1 | $375 = 1100 - 1080e^{k(1)}$<br>$e^{k} = \frac{725}{1080}$<br>$k = \ln\left(\frac{725}{1080}\right)$<br>$k = -0.4$ |
| | Rearranges and correctly takes logs of both sides to eliminate e<br>PI by correct answer | 1.1a | M1 | |
| | Obtains AWRT $-0.4$ | 1.1b | A1 | |
| | **Subtotal** | | **3** | |

| Q | Marking instructions | AO | Marks | Typical solution |
|---|---|---|---|---|
| **11(b)(ii)** | Substitutes $t = 4.5$ into their model<br>Condone use of $t = 5.5$<br>Or<br>Substitutes $\theta = 1020$ into their model | 3.1b | M1 | $\theta = 1100 - 1080e^{-0.4(4.5)}$<br>$\theta = 921.5$<br><br>This is significantly different from the actual temperature of 1020 °C so the model is not very accurate. |
| | Obtains AWRT $\theta$ = 920<br>Or<br>$t$ = AWRT 6.5 | 1.1b | A1 | |
| | Compares AWRT 920 to 1020, comments on the significant difference and concludes that the model is not very accurate<br>For example:<br>• 100C below<br>• AWRT 10% below<br>• Well below OE<br>Or<br>6.5 is well above 4.5 and concludes that the model is not very accurate | 3.2b | R1 | |
| | **Subtotal** | | **3** | |

| | | | | |
|---|---|---|---|---|
| | **Question 11 Total** | | **8** | |