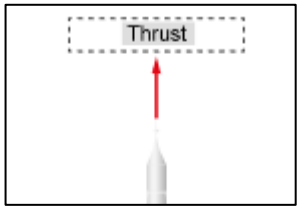
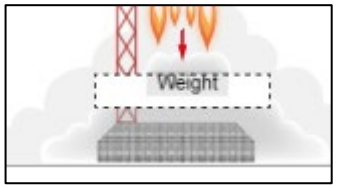
Question		Answers	Notes	Total	Crit
1	a	carbon dioxide + water → Glucose + Oxygen		2	A
	b	Elements		1	A
	c	Soil is not used in photosynthesis Nutrients can be obtained from water		2	A
	d	Plants containing chlorophyll absorb a high percentage of blue ***or*** red light Absorbance of green light is low ***or*** (plants with chlorophyll) reflects the green light ***or*** do not absorb green light	*WTTE*	2	C
	e	HCl ***or*** acid in stomach Activates enzymes or pepsin (so protein is) broken down into amino acids		3	A

2	**a**	Conduction		**1**	A
	b	The layers work by trapping air Air is a poor conductor of heat		**2**	A
	c	Shiny ***or*** white surfaces reflect radiation / heat / thermal energy ***or*** Shiny ***or*** white fabric is a poor absorber of radiation / heat / thermal energy		**1**	A
	d	Energy is released from the body ***or*** transferred (to the PCM) PCM absorbs energy (from body) (and hence PCM) turns into liquid or melts (and hence) body temperature falls		**4**	A

3	**a**	The net / resultant force is zero ***or*** The forces are equal and opposite ***or*** The up force cancels out the down force		**1**	A
	b	 		**2**	A
	c	F = ma seen or implied Correct substitution seen or implied 50 000 (kg) x 10 (Nkg^{-1}) = 500 000 (N) 3 500 000 N	*Accept W=ma or F=mg or W=mg* *Unit must be present for third mark. No ecf from marking point 2.* *Award two marks only if correct answer with no working and no unit is seen. Accept 3.5 x 10^6 N*	**3**	A

3	**d**	$2H_2 + O_2 \rightarrow 2H_2O$ Correct reactants Correct products Correct coefficients: 2-1-2	*Ignore state symbols*	**3**	A
	e	***Accept any reasonable response related to the equation, for example max 1*** • *it reacts with oxygen (so is a good fuel)* • *it releases a large amount of energy on combustion* • *only water is product* • *product is not harmful*		**1**	A

4	**a**	Method		**1**	A
	b	Difficult to tell when the egg is cooked Albert stopped his clock when it was mostly cooked ***or*** Betty stopped her clock when it was fully cooked	*WTTE*	**2**	C
	c	One precaution necessary when using heat Precaution explicitly linked to being burnt		**2**	B
	d	How does the <u>temperature</u> (of the hob) Affect the <u>time</u> it takes To cook an <u>egg</u>		**3**	B
	e	***Any two control variables, for example [max 2]*** • size of egg, • amount of oil added, • type of pan, • material of pan • size of pan, • what a cooked egg looks like or person doing the timing		**2**	B

4	**f**	Plot one point correctly Plot all the points correctly An appropriate line of best fit is added x axis label Cooking temperature ***and*** degrees C / °C		**4**	C
	g	320-330 ***and*** seconds ***or*** s	*ECF from part f*	**1**	C
	h	As temperature increases, kinetic energy of (water) particles increases Energy (from the water) is absorbed by molecules in the raw egg		**2**	C
	i	Repeat experiment Take an average of the results Reduce (random) errors ***or*** So more accurate/valid/reliable		**3**	C

5

	1	2	3	4
Hypothesis	if mass of yeast increases the volume of the dough will change	if mass of yeast increases then the volume of the dough increases	• if mass of yeast increases then the volume of the dough increases Because more CO_2 will be formed	• if mass of yeast increases then the volume of the dough increases • Because more CO_2 will be formed Further point linked to expansion eg CO_2 will be stuck in the dough making it expand
Variables	IV identified as mass of yeast ***or*** DV identified as final volume/height of dough	IV identified as mass of yeast ***and*** DV identified as final volume/height of dough	IV identified as mass of yeast ***and*** DV identified as final volume/height of dough ***and*** at least 1 CV explicitly identified	IV identified as mass of yeast ***and*** DV identified as final volume/height of dough ***and*** at least 2 CV explicitly identified
Equipment used in method	Some equipment is listed	Balance to measure the mass of yeast (IV) ***or*** Equipment to measure volume/height of dough (DV)	Balance to measure the mass of yeast (IV) ***and*** Equipment to measure volume/height of dough (DV)	Balance to measure the mass of yeast (IV) ***and*** Equipment to measure volume/height of dough (DV) ***and*** Equip linked to at least two CV that has been identified the method
Details of Method	Method copied from stem with no attempt to vary	Attempt to vary mass of yeast, method can be followed but detail is incomplete or incorrect	Method to vary the mass of yeast and measure the volume of dough, fully explained and could easily be followed	Complete method to vary the mass of yeast and measure the volume of dough, fully detailed, explained and could easily be followed. a**nd** Volumes of various measurements and equipment match
Data	Method includes at least 5 values of IV ***or*** three trials	Method includes 5 values of IV with 3 trials	Method includes 5 values of IV with 3 trials and plans to calculate average	

19 B

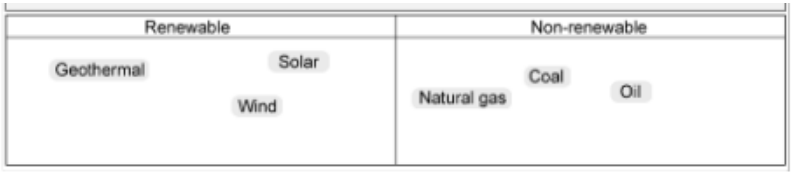
<table>
<tr><td>6</td><td>a</td><td>The throw (strength, force, direction) or how pasta hits the wall

Any sensible improvement, for example [max 1]
• place the pasta on the wall
• place on board and lift board up
• catapult it</td><td>WTTE</td><td>2</td><td>C</td></tr>
<tr><td></td><td>b</td><td>
<table>
<tr><td>Time pasta is cooked for /min</td><td colspan="4">Time pasta sticks to the wall /s</td></tr>
<tr><td></td><td>Trial 1</td><td>Trial 2</td><td>Trial 3</td><td>Average</td></tr>
<tr><td>2</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>4</td><td>3</td><td>4</td><td>2</td><td>3</td></tr>
<tr><td>6</td><td>4</td><td>5</td><td>6</td><td>5</td></tr>
<tr><td>8</td><td>19</td><td>15</td><td>18</td><td>17</td></tr>
<tr><td>10</td><td>59</td><td>58</td><td>60</td><td>59</td></tr>
<tr><td>12</td><td>60</td><td>60</td><td>59</td><td>60</td></tr>
<tr><td>14</td><td>60</td><td>60</td><td>60</td><td>60</td></tr>
<tr><td>16</td><td>60</td><td>60</td><td>60</td><td>60</td></tr>
</table>
Calculate two averages correctly 17(.3333) and 60 / 59.66667

Both averages rounded correctly</td><td></td><td>2</td><td>C</td></tr>
<tr><td></td><td>c</td><td>C</td><td></td><td>1</td><td>C</td></tr>
<tr><td></td><td>d</td><td>Data tells us when it is cooked

Data does not tell us when it is overcooked

so partially valid or valid for below 10-12 mins
or
so partially invalid or invalid above 12 mins</td><td>WTTE</td><td>3</td><td>C</td></tr>
</table>

7	**a**	 One mark for 2 terms in the correct location Two marks for all terms in the correct location		**2**	A
	b	Renewable sources can be replaced ***and*** non-renewable cannot be replaced	*Do **not** accept definitions using the word renewable*	**1**	D
	c	***A trend shown in the table, [max 2]*** • increased access to electricity to either better literacy or increased life expectancy • Countries with full access to electricity have (significantly) lower % of 5-year-olds malnourished • countries 100 % access have higher CO_2 emissions ***Correctly linked justification, [max 2]*** • More time available to spend in study • Access to educational materials • Can learn at night • Specified reason for malnourishment • Burn fossil fuels to provide electricity		**4**	D
	d	Country C 100 % energy access (as it has) the lowest level of CO_2 emissions		**3**	D

<table>
<tr><td>8</td><td>a</td><td>Risk of fire
or
Inhalation of smoke (particles) or CO_2</td><td></td><td>1</td><td>D</td></tr>
<tr><td></td><td>b</td><td colspan="3">
<table>
<tr><th></th><th>1</th><th>2</th><th>3</th><th>4</th></tr>
<tr><td>Use of LED</td><td>A statement of a strength or a limitation of LED</td><td>A statement of strength and a limitation of LED</td><td>A strength and a limitation of LED with one supported by information from the table</td><td>A strength and a limitation of LED with both supported by information from the table</td></tr>
<tr><td>Environmental</td><td>an environmental advantage or disadvantage</td><td>an environmental advantage and disadvantage</td><td>an environmental advantage and disadvantage and justification of either</td><td>an environmental advantage and disadvantage and justification of both</td></tr>
<tr><td>Economic</td><td>statement of initial cost or running cost</td><td>statement of initial cost and running cost</td><td>statement of initial cost and running cost supported with information from the table</td><td>statement of initial cost and running cost with comparison of these two costs using information from the table</td></tr>
<tr><td>Conclusion</td><td>A recommendation is made</td><td>A recommendation is made linked to one of the arguments presented</td><td></td><td></td></tr>
</table>
</td><td>14</td><td>D</td></tr>
</table>