



# Cambridge International AS & A Level

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**INFORMATION TECHNOLOGY**

**9626/04**

Paper 4 Advanced Practical

**May/June 2023**

MARK SCHEME

Maximum Mark: 90

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**Published**

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge International will not enter into discussions about these mark schemes.

Cambridge International is publishing the mark schemes for the May/June 2023 series for most Cambridge IGCSE, Cambridge International A and AS Level and Cambridge Pre-U components, and some Cambridge O Level components.

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This document consists of **16** printed pages.

**Generic Marking Principles**

These general marking principles must be applied by all examiners when marking candidate answers. They should be applied alongside the specific content of the mark scheme or generic level descriptors for a question. Each question paper and mark scheme will also comply with these marking principles.

**GENERIC MARKING PRINCIPLE 1:**

Marks must be awarded in line with:

- the specific content of the mark scheme or the generic level descriptors for the question
- the specific skills defined in the mark scheme or in the generic level descriptors for the question
- the standard of response required by a candidate as exemplified by the standardisation scripts.

**GENERIC MARKING PRINCIPLE 2:**

Marks awarded are always **whole marks** (not half marks, or other fractions).

**GENERIC MARKING PRINCIPLE 3:**

Marks must be awarded **positively**:

- marks are awarded for correct/valid answers, as defined in the mark scheme. However, credit is given for valid answers which go beyond the scope of the syllabus and mark scheme, referring to your Team Leader as appropriate
- marks are awarded when candidates clearly demonstrate what they know and can do
- marks are not deducted for errors
- marks are not deducted for omissions
- answers should only be judged on the quality of spelling, punctuation and grammar when these features are specifically assessed by the question as indicated by the mark scheme. The meaning, however, should be unambiguous.

**GENERIC MARKING PRINCIPLE 4:**

Rules must be applied consistently, e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors.

**GENERIC MARKING PRINCIPLE 5:**

Marks should be awarded using the full range of marks defined in the mark scheme for the question (however; the use of the full mark range may be limited according to the quality of the candidate responses seen).

**GENERIC MARKING PRINCIPLE 6:**

Marks awarded are based solely on the requirements as defined in the mark scheme. Marks should not be awarded with grade thresholds or grade descriptors in mind.

<b>Task</b>	<b>Answer</b>	<b>Marks</b>
1(a)	Basic Wheel is created and saved as svg.	<b>1</b>
	The size of the wheel = 250 ±5 px checked in an editor or a test page.	<b>1</b>
	The hub is circular, the correct size and placed centrally.	<b>1</b>
	The spokes are consistent, outlined, correctly aligned and orientated with no overlap on the rim.	<b>1</b>
	The wheel has thin Black outlines. The fill colour = #505050 checked in an editor or using a colour picker tool.	<b>1</b>
	The hub is 'red', coloured = #ff0000 checked in an editor or using a colour picker tool.	<b>1</b>
1(b)	NewWheel is created and saved as svg – all spokes and hub must be redesigned.	<b>1</b>
	... Size = 250 ±5 svg units checked in an editor or a test page.	<b>1</b>
	All spokes are redesigned and in the correct proportions.	<b>1</b>
	The rim has a thin Black outline and a grey fill – <i>independent if BasicWheel edited.</i>	<b>1</b>
	The hub is coloured Gold/Yellow – checked visually.	<b>1</b>
	The hub is hexagonal, regular, the correct size and central – visually.	<b>1</b>
	The spoke design is consistent, all spokes are concave with identical curves at the rim.	<b>1</b>
	All spokes sit on the rim with the correct overlap.	<b>1</b>
	The central spline of the spoke is black.	<b>1</b>
	The outer area of all spokes are grey with a black outline.	<b>1</b>
	The central spoke Junction is consistent, central and clean.	<b>1</b>
		<b>[17]</b>

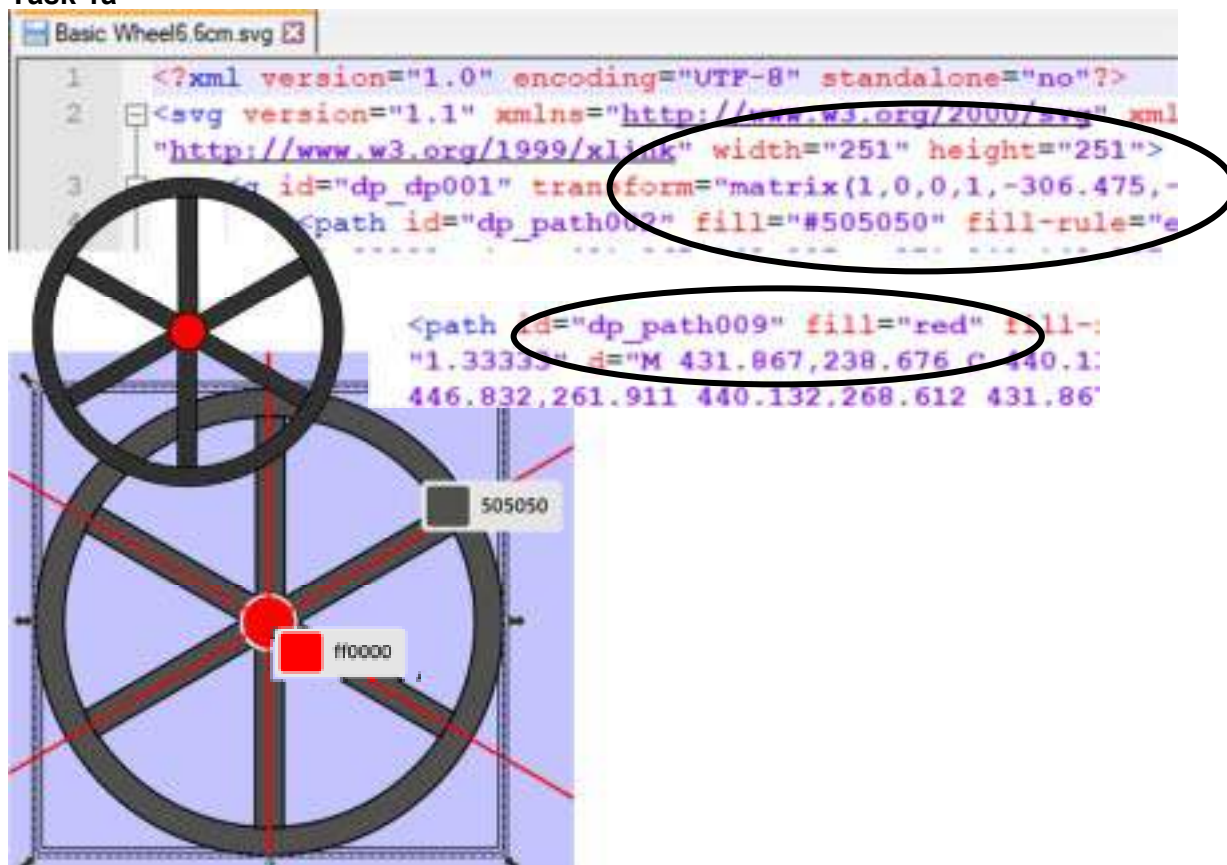
Task	Answer	Marks
2	The frame is 400px by 100px $\pm 5$ – <i>must animate immediately.</i>	1
	The Basic Wheel image is used – undistorted.	1
	The 2 wheels are the same size – visually.	1
	Spokes are grouped with the wheel(s) – <i>wheel(s) must rotate – can be partially.</i>	1
	The hub is present and intact – <i>wheels must rotate – can be partially.</i>	1
	The wheels are aligned horizontally – visually.	1
	The belt has a black outline with a solid brown/red fill – <i>all visible.</i>	1
	The belt thickness is consistent – <i>all visible.</i>	1
	The belt fits both wheels exactly – <i>all visible.</i>	1
	The yellow patch is fully visible and fits inside the belt at all times and in all positions.	1
	The wheels and belt (patch) appear to rotate fully including in the curves.	1
	The belt (patch) appears to rotate convincingly/smoothly – at the set speed.	1
	The wheels are animated – appear in sync and are fully rotating at all times.	1
	... the wheels rotate convincingly/smoothly – at the set speed.	1
	The patch moves horizontally on the top and bottom of the belt.	1
	The patch moves horizontally on the top and bottom inside the belt.	1
	The patch is curved at the ends -it moves cleanly round both wheels inside n the belt.	1
	The animation 'Loops' continuously.	1
	The animation has no obvious (twitchy) restarts.	1
	The image is transparent.	1
		<b>[20]</b>

Task	Answer	Marks
3	There is an attempt to extract the Country codes – All entries.	1
	There is evidence of a Method or a formula used to extract the Country codes.	1
	All Country codes are correct – <i>independent</i> – even if no evidence of method.	1
	... All Country codes are only 3 Chrs and <b>centred</b> .	1
	The use of FIND() or SEARCH() is seen.	1
	The use of "-" and +1 e.g. FIND("-",D3)+1, SEARCH("-",D3)+1 is seen.	1
	The use of MID() is seen.	1
	A valid formula is seen and is replicable – spills down correctly – <i>Test</i> .	1
	Individual Country codes are seen in correct cells – <i>not full list of 35</i> .	1
	There are the correct number of Country codes – only – H9:H29.	1
	... All Country codes are correct – <i>not full list of 35</i> .	1
	... The Country codes are in <b>ascending</b> order – <i>not full list of 35</i> .	1
	Valid Method to remove duplicates is seen- <i>check Evidence doc</i> . Including the use of the Unique() function.	1
	The Country names are displayed in the correct cells	1
	Use of a valid formula is seen e.g. LOOKUP() VLOOKUP(), XLOOKUP(), INDEX/MATCH()	1
	All references to the Country Codes are absolute. Only columns A and B of the data are used.	1
	... the formula spills down correctly – <b>Test</b> – <b>only if absolute references</b>	1
	All Country names match the codes – <i>only if evidence of method</i>	1
	There is evidence of the method or a valid formula is seen. e.g. SUMIF() SUMIFS() with	1
	The references are absolute. $$$F$3:$F$149$ , $$$E$3:$E$149$ , F:F, E:E, or <i>named ranges are used</i> .	1
The formula is replicable – spills down correctly. – <b>Test</b>	1	
All Sales totals are correct. – <i>independent</i> – even if no evidence of method	1	
The Totals update with changed data. – <b>Test</b> – <b>Delete E5</b>	1	
There is a valid Formula for calculating the Number meeting the target. e.g. <b>COUNTIF(J9:J29,"&gt;=H3)</b>	1	

<b>Task</b>	<b>Answer</b>	<b>Marks</b>
3	... The Number meeting the target is Red, Bold and in the same format as the value in cell H3.	1
	The Number meeting a target of 190000 = 12. – <b>Test</b>	1
	The Number meeting a target 220000 = 5, 4 if data not added – <b>Test</b>	1
	Conditional formatting is applied to <b>H9:J29</b> . -confirm – Allow if more rows in range	1
	... a <b>single</b> formula is used. ‘ = <b>J9&gt;=\$H\$3</b> ’ -confirm	1
	The conditional formatting <b>works</b> for <b>correct whole</b> rows.	1
	The cells are red, the text is white/light grey. whole row – <i>independent if conditional</i>	1
	The text is italic with a consistent font and size. whole row – <i>independent if conditional</i>	1
	The borders are shown on the red cells (only). whole row – <i>independent if conditional</i>	1
	The total for Serbia is now €231,100 – <i>independent</i>	1
	... The correct data is <b>INCLUDED</b> . Kias Tucran, KTU412576, 4-SRB-13, 34300 – <b>100%</b>	1
	... the Serbia row is now red. – <i>only if conditional</i> – <b>Test</b>	1
		<b>[36]</b>

Task	Answer	Marks
4	The Interval timer is changed to 100.	1
	There is a valid variable for count. – can be any name.	1
	There is a valid attempt to create a 'loop'. – e.g. case, if, for, while, etc	1
	document.getElementById is used.	1
	document.getElementById uses <i>ImageDisplay</i> as the bookmark.	1
	A function() to stop the animation is added – it must contain code.	1
	The Start button starts an animation – within 2-3 seconds.	1
	... the page remains intact – images are always seen.	1
	The animation is smooth with 1/10th second rotations.	1
	The animation loops without an obvious restart (twitch).	1
	A 'Stop' <b>button</b> is added – it must be a button – not just text.	1
	... the animation stops – this must be clear.	1
	... the animation can restart.	1
	Animate.js is referenced in html file – no copy of the code in html.	1
	Animate.js referenced in html file between <b>&lt;script&gt;</b> tags <b>&lt;/script&gt;</b> .	1
	The <b>&lt;script&gt;</b> tags are in the <b>head</b> or <b>body</b> sections.	1
The code for the Start/Stop buttons match. The function names match in the html and the JavaScript.	1	
		[17]

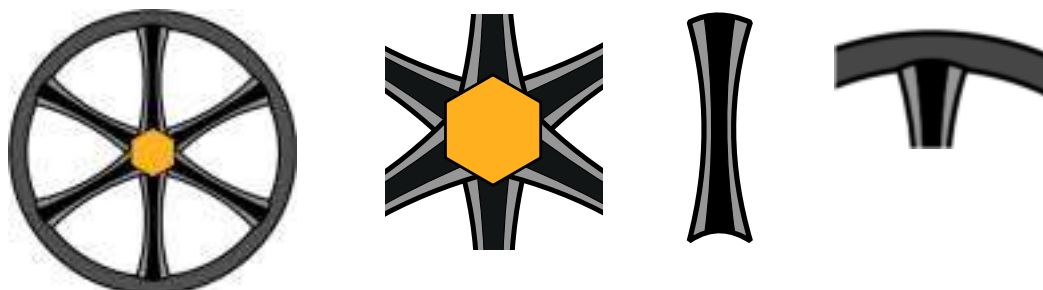
## Task 1a



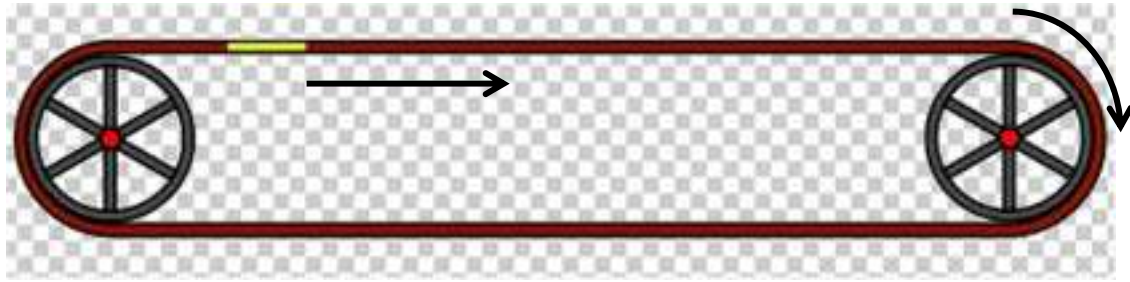
<b>Task 1</b>	Basic Wheel is created and saved as svg.	1
Basic Wheel	The size of the wheel = 250 ±5 px checked in an editor or a test page.	1
	The hub is circular, the correct size and placed centrally.	1
	The spokes are consistent, outlined, correctly aligned and orientated with no overlap on the rim.	1
Check in Browser	The wheel has thin Black outlines. The fill colour = #505050 checked in an editor or using a colour picker tool.	1
	The hub is "red", coloured = #ff0000 checked in an editor or using a colour picker tool.	1



## Task 1b



New wheel	NewWheel is created and saved as svg – all spokes and hub must be redesigned.	1
	... Size = 250 ±5 svg units checked in an editor or a test page.	1
	All spokes are redesigned and in the correct proportions.	1
Check in Browser (enlarge)	The rim has a thin Black outline and a grey fill – <i>independent if BasicWheel edited.</i>	1
	The hub is coloured Gold/Yellow – checked visually.	1
	The hub is hexagonal, regular, the correct size and central – visually.	1
	The spoke design is consistent, all spokes are concave with identical curves at the rim.	1
	All spokes sit on the rim with the correct overlap.	1
	The central spline of the spoke is black.	1
	The outer area of all spokes are grey with a black outline.	1
The central spoke Junction is consistent, central and clean.	1	
		17

**Task 2**

<b>Task 2</b>	The wheels are aligned horizontally – visually.	1
<b>Wheels</b>  Must Animate for any marks	The belt has a black outline with a solid brown/red fill – <i>all visible</i> .	1
	The belt thickness is consistent – <i>all visible</i> .	1
	The belt fits both wheels exactly – <i>all visible</i> .	1
	The yellow patch is fully visible and fits inside the belt at all times and in all positions.	1
	The wheels and belt (patch) appear to rotate fully including in the curves.	1
	<b>Belt</b>  Must Animate for any marks	The belt (patch) appears to rotate convincingly/smoothly – at the set speed.
The wheels are animated – appear in sync and are fully rotating at all times.		1
... the wheels rotate convincingly/smoothly – at the set speed.		1
The patch moves horizontally on the top and bottom of the belt.		1
The patch moves horizontally on the top and bottom inside the belt.		1
The patch is curved at the ends -it moves cleanly round both wheels inside n the belt.		1
<b>Rotation</b>  Must Rotate for any marks	The animation ‘Loops’ continuously.	1
	The animation has no obvious (twitchy) restarts.	1
	The image is transparent.	1
	The wheels are aligned horizontally – visually.	1
	The belt has a black outline with a solid brown/red fill – <i>all visible</i> .	1
	The belt thickness is consistent – <i>all visible</i> .	1
	The belt fits both wheels exactly- <i>all visible</i> .	1
	The yellow patch is fully visible and fits inside the belt at all times and in all positions.	1
		<b>20</b>

**Task 3**

The is an attempt to extract the Country codes – All entries.	1
There is evidence of a Method or a formula used to extract the Country codes.	1
All Country codes are correct – <i>independent – even if no evidence of method.</i>	1
... All Country codes are only 3 Chrs and <i>centred.</i>	1

**Alternative methods include use of text to columns using extra columns – lose ‘formula’ mark**

The use of FIND() or SEARCH() is seen.	1
The use of "-" and +1 e.g. <i>FIND("-",D3)+1, SEARCH("-",D3)+1</i> is seen.	1
The use of MID() is seen.	1
A valid formula is seen and is replicable – spills down correctly – <i>Test.</i>	1

**Alternative methods include copying column F and removing duplicates – efficiency marks for using a formula.**

Individual Country codes are seen in correct cells – <i>not full list of 35.</i>	1
The are the correct number of Country codes – only – H9:H29.	1
... All Country codes are correct – <i>not full list of 35.</i>	1
... The Country codes are in <b>ascending</b> order – <i>not full list of 35.</i>	1
Valid Method to remove duplicates is seen- <i>check Evidence doc.</i> Including the use of the Unique() function.	1

Total Sales by Region
Region
=LOOKUP(H9,CountryCodes!\$B\$1:\$B\$35,CountryCodes!\$A\$1:\$A\$35)
=INDEX(CountryCodes!\$A\$1:\$A\$35,MATCH(H10,CountryCodes!\$B\$1:\$B\$35,0))
=XLOOKUP(H11,CountryCodes!\$B\$1:\$B\$35,CountryCodes!\$A\$1:\$A\$35,"",0)

**3 different formula methods**

The Country names are displayed in the correct cells	1
Use of a valid formula is seen e.g. <i>LOOKUP()</i> <i>VLOOKUP()</i> , <i>XLOOKUP()</i> , <i>INDEX/MATCH()</i>	1
All references to the Country Codes are absolute. Only columns A and B of the data are used.	1
... the formula spills down correctly – <b>Test – only if absolute references</b>	1
All Country names match the codes – <i>only if evidence of method</i>	1

Total
=SUMIF(F:F,H9,E:E)
=GETPIVOTDATA("Sum of Sales (€)",\$\$S\$3,"Region","BEL")
=ST\$6

**3 different formula methods including use of a pivot table.****Efficiency marks for the use of formulae**

There is evidence of the method or a valid formula is seen. e.g. <i>SUMIF()</i> <i>SUMIFS()</i> with	1
The references are absolute. <i>\$F\$3:\$F\$149</i> , <i>\$E\$3:\$E\$149</i> , <i>F:F</i> , <i>E:E</i> , or <i>named ranges</i> are used.	1
The formula is replicable – spills down correctly. – <b>Test</b>	1
All Sales totals are correct. – <i>independent – even if no evidence of method</i>	1
The Totals update with changed data. – <b>Test – Delete E5</b>	1

Number meeting target
=COUNTIF(J9:J29,">="&H3)

There is a valid Formula for calculating the Number meeting the target. e.g. <b>Countif(J9:J29,"&gt;=H3)</b>	1
... The Number meeting the target is Red, Bold and in the same format as the value in cell H3.	1
The Number meeting a target of 190000 = 12. – <b>Test</b>	1
The Number meeting a target 220000 = 5, 4 if data not added – <b>Test</b>	1

Sales Target		Number meeting target
€ 220,000		4

Total Sales by Region		Total
Region		
AUT	Austria	€ 153,500
BEL	Belgium	€ 178,200
CHE	Switzerland	€ 219,200
CYP	Cyprus	€ 121,100
CZE	Czechia	€ 195,000
DEU	Germany	€ 189,700
<b>DNK</b>	<b>Denmark</b>	<b>€ 225,600</b>
ESP	Spain	€ 192,720
EST	Estonia	€ 204,300
FIN	Finland	€ 203,200
FRA	France	€ 191,900
<b>GRC</b>	<b>Greece</b>	<b>€ 268,400</b>
<b>HRV</b>	<b>Croatia</b>	<b>€ 238,100</b>
HUN	Hungary	€ 183,700
IRL	Ireland	€ 189,000
ITA	Italy	€ 183,200
<b>LUX</b>	<b>Luxembourg</b>	<b>€ 228,900</b>
NLD	Netherlands	€ 119,400
NOR	Norway	€ 209,700
POL	Poland	€ 187,100
SRB	Serbia	€ 196,800



Conditional formatting is applied to <b>H9:J29</b> . - confirm – Allow if more rows in range	1
... a <b>single</b> formula is used. ‘ <b>=\$J9&gt;=\$H\$3</b> ’ - confirm	1
The conditional formatting <b>works</b> for <b>correct whole</b> rows.	1
The cells are red, the text is white/light grey. whole row – <i>independent if conditional</i>	1

Given_name	Family_name	Payroll_number	Reference	Sales (€)
Kias	Tucran	KTU412576	44-SRB-13	34300

ITA	Italy	€ 185,200
<b>LUX</b>	<b>Luxembourg</b>	<b>€ 228,900</b>
NLD	Netherlands	€ 119,400
NOR	Norway	€ 209,700
POL	Poland	€ 187,100
<b>SRB</b>	<b>Serbia</b>	<b>€ 231,100</b>

The text is italic with a consistent font and size. whole row – <i>independent if conditional</i>	1
The borders are shown on the red cells (only). whole row – <i>independent if conditional</i>	1
The total for Serbia is now €231,100 – <i>independent</i>	1
... the correct data is <b>INCLUDED</b> . Kias Tucran, KTU412576, 4-SRB-13, 34300 – <b>100%</b>	1
... the Serbia row is now red. – <i>only if conditional</i> – <b>Test</b>	1

**[36]**

**Task 4**



<b>Testing page</b>	The Start button starts an animation – within 2–3 seconds.	1
	... the page remains intact – images are always seen.	1
	The animation is smooth with 1/10th second rotations.	1
	The animation loops without an obvious restart (twitch).	1
	A 'Stop' <b>button</b> is added – it must be a button – not just text.	1
	... the animation stops – this must be clear.	1
	... the animation can restart.	1

**A stop motion animation**



Click the button to start the animation:



```

1 function Animate()
2 {
3   var count=1;
4
5   setInterval(Timer, 100); //This will call the Timer function - units are milliseconds
6
7   function Timer()
8   {
9     count=count-1;
10
11
12     switch (count) //The switch statement will select the block corresponding to the
13     //number of the count variable
14     {
15       case 2:
16         document.getElementById("ImageDisplay").src='Spiral2.png';
17         break;
18       case 1:
19         document.getElementById("ImageDisplay").src='Spiral1.png';
20         break;
21       case 0:
22         document.getElementById("ImageDisplay").src='Spiral0.png';
23         Animate ();
24     }
25 }

```

<b>Task 4</b>	The Interval timer is changed to 100.	1
<b>Inspect .js file</b>	There is a valid variable for count. – can be any name.	1
	There is a valid attempt to create a 'loop'. – e.g. case, if, for, while, etc	1
	document.getElementById is used.	1
	document.getElementById uses <b>ImageDisplay</b> as the bookmark.	1
	A function() to stop the animation is added – it must contain code.	1

```

12 <script src="AnimateSolution.js"></script>
13
14 </head>
32 <p>Click the button to start the animation</p><br>
33 <p> <button type="button" onClick="Animate()" ><h2>Start</h2></button> </p>
34 <p> <button type="button" onClick="location.reload()" >Stop</button> </p>

```

<b>Inspect html</b>	Animate.js is referenced in html file – no copy of the code in html.	1
	Animate.js referenced in html file between <b>&lt;script&gt;</b> tags <b>&lt;/script&gt;</b> .	1
	The <b>&lt;script&gt;</b> tags are in the <b>head</b> or <b>body</b> sections.	1
	The code for the Start/Stop buttons match. The function names match in the html and the JavaScript.	1

[17]