

## Quality Assurance Mark Scheme

Q1.

Question	Answer	Additional guidance	Mark
(a)	<p>B3 The chart should have</p> <ul style="list-style-type: none"> <li>• a line showing the target weight at 510 g</li> <li>• Lines showing warning limits at 550 g and 470 g</li> <li>• Lines showing action limits at 570 g and 450 g</li> <li>• The sample means (495 g and 558 g) are plotted</li> </ul> <p>B2</p> <ul style="list-style-type: none"> <li>• 495 g is inside the warning limits no action is required</li> <li>• 558 g is between the warning limits and action limits another sample should be taken</li> </ul>	<p>B5 for a complete explanation including the key values explaining how the quality control chart is drawn and used</p> <p>(Award B1 for each correct bullet point to a maximum of B3 for the first four bullet points)</p>	(5)
(b) (i)	B1 approximately equal to		(1)
(b) (ii)	B1 greater than		(1)

Q2.

Question	Answer	Additional guidance	Mark
(a)	B1 e.g. Half of the chocolate bars would be unsellable (below 60 g in weight)	B1 for any suitable reason	(1)
(b)	<p>B1 mean of population should be approximately equal to mean of sample / 62 g</p> <p>B1 standard deviation of population will be greater than standard deviation of sample means / 0.4 g</p>	<p>B1 for a correct deduction about the mean</p> <p>B1 for a correct deduction about the standard deviation</p>	(2)
(c)	<p>M1 warning lines are <math>\bar{x} \pm 2</math> s.d. action lines are <math>\bar{x} \pm 3</math> s.d.</p> <p>A1 61.2 and 62.8 and 60.8 and 63.2</p> <p>A1 warning lines and action lines drawn on graph</p> <p>B1 sample 7 is outside warning lines</p> <p>B1 so another sample 8 should have been taken immediately</p> <p>B1 sample 8 is also outside action limits so the machine should be stopped and reset</p>	<p>M1 for attempting to find warning lines or action lines</p> <p>A1 for correctly calculating the warning lines</p> <p>A1 for correctly drawing warning and action lines</p> <p>B1 for identifying sample 7 outside warning line</p> <p>B1 for stating the appropriate action to take after sample 7</p> <p>B1 for stating the appropriate action to take after sample 8</p>	(6)

**Q3.**

Question number	Answer	Additional guidance	Mark
(a)	B1 lower warning line added at 4.0 and labelled. B1 both action lines correct and labelled (Upper line at 4.25, lower line at 3.95)	B1 for knowing warning lines should be symmetrical. B1 for knowing that action lines should be $3 \times \text{s.d.}$ from the mean. Both lines correct with correct labels.	(2)
(b)	B1ft Another sample should be taken immediately  B1 If further sample is also beyond warning line then production should be stopped. (If within warning lines then production can continue.)	B1ft for attempting correct practical decision based on position of their value relative to warning/action lines. B1 (cao) for complete description of actions needed including criteria for stopping after a second sample.	(2)
(c)	B1 David is incorrect because sample means will be more closely grouped than individual values OR standard deviation will be $>0.05$	B1 for demonstrating understanding that sample means will have a closer <u>grouping</u> .	(1)

**Q4.**

	5ST1H_01 Scheme	Marks
(a)	Horizontal lines at 108 and 110, labelled <b>warning</b> and <b>action</b> respectively	B2 (2)
(b)	5	B1 (1)
(c)(i)	point plotted (6, 97.8)	B1 (1)
(c)(ii)		B1
(d)	Production line must be stopped  If a sample (mean) is <b>between</b> warning <b>and</b> action limits a further sample is taken. If further sample is also outside warning limits then stop the process OR If further sample is within warning limits take no action	B1 B1 dB1 (3)
	<b>Notes</b>	<b>[8]</b>
(a)	B2 lines and labels (B1 1 line + correct label or both lines and no/incorrect labels)	
(c)(i)	Point plotted between (6, 97.2) and (6, 98)	
(c)(ii)	B1 allow reset/adjusted	
(d)	1 <sup>st</sup> B1 for sample between warning and action limits 2 <sup>nd</sup> B1 for a further sample is taken 3 <sup>rd</sup> B1 dependent on at least one B1 being earned previously for a correct decision of what action to take following the outcome of the further sample	

**Q5.**

Question	Scheme	Marks
(a)	Another sample should be taken (immediately)	B1 (1)
(b)(i)	5.2	B1
(ii)	Point plotted at (7, 5.2)	B1ft
(iii)	The machine should be shut down/reset.	B1ft
		(3)
		<b>[4]</b>
Notes		
(ii)	Allow $\frac{1}{2}$ square tolerance Follow through their answer to (b)(i) but must be plotted above the 7	
(iii)	Must have an answer to part (b)(i) or (b)(ii) Must fit their answer to (b)(ii). If no answer to (b)(ii), must fit their (b)(i) If their answer to (b)(ii) lies between 4 and 5 allow 'take another sample' or 'shut down/reset the machine' If their answer to (b)(ii) < 4, then e.g. 'no further action is required'/'allow machine to continue'	