

Qu	Scheme	Marks	AO
1. (a)	Systematic (sampling)	B1 (1)	1.2
(b)(i)	[Daily Mean] Wind Speed	B1	2.2a
(ii)	Light	B1 (2)	1.2
(c)	Variable A occurs most (around 80~90%) of the time	B1 (1)	2.2b
<b>Notes</b>			
(a)	B1 for identifying the correct sampling technique Allow slight misspelling e.g. “sysmatic”, “sytmatic” Do NOT allow “systemic”		
(b)(i)	B1 for identifying appropriate qualitative variable. {LDS mark} Allow “Wind speed” or “Wind strength” but NOT just “wind” or “wind direction”		
(ii)	B1 for realising that modal wind speed is “Light” {LDS mark} Allow just “light” or “most light”		
<b>NB</b>	These two B marks are independent so can score B0B1 for e.g. “rainfall” and “light”		
(c)	B1 for inferring that frequency of A can be estimated fairly reliably: {underestimates B and over estimates C} e.g. “A is the most frequent” [can then ignore comments about B and C]		

Qu 2	Scheme	Marks	AO
(a)	<b>Disadvantage:</b> e.g. Not random; cannot use (reliably) for inferences	B1	1.1b
(b)	[Sight or correct use of] $X \sim B(36, 0.08)$	M1	3.3
(i)	$P(X = 4) = 0.167387\dots$ awrt <b>0.167</b>	A1	1.1b
(ii)	$[P(X \geq 7) = 1 - P(X \leq 6) = ] 0.022233\dots$ awrt <b>0.0222</b>	A1	1.1b
(c)	$P(\text{In dance club and dance tango}) = 0.4 \times 0.08 = \underline{\underline{0.032}}$ or $\frac{4}{125}$ or <u>3.2%</u>	B1	1.1b
(d)	[Let $T =$ those who can dance the Tango. Sight or use of] $T \sim B(50, "0.032")$ $[P(T < 3) = P(T \leq 2) = ] 0.7850815\dots$ awrt <b>0.785</b>	M1 A1	3.3 1.1b
		(1) (3) (1) (2) <b>(7 marks)</b>	
<b>Notes</b>			
(a)	B1 for a suitable disadvantage:		
	<b>Allow (B1)</b>	<b>Do NOT allow (B0)</b>	
	Not random <u>or</u> less random (o.e.)	Not representative	
	Cannot use (reliably) for inferences	Less accurate	
	(More likely to be) biased	Any comment based on time or cost	
		Any mention of skew	
		Any mention of non-response	
(b)	M1 for sight of $B(36, 0.08)$ Allow in words: <u>binomial</u> with $n = 36$ and $p = 0.08$ may be implied by one correct answer to 2sf <u>or</u> sight of $P(X \leq 6) = 0.97776\dots$ i.e. awrt 0.98 Allow for $36C4 \times 0.08^4 \times 0.92^{32}$ as this is "correct use"		
(i)	1 <sup>st</sup> A1 for awrt 0.167 NB An answer of just awrt 0.167 scores M1( $\Rightarrow$ )1 <sup>st</sup> A1		
(ii)	2 <sup>nd</sup> A1 for awrt 0.0222		
(c)	B1 for 0.032 o.e. (Can allow for sight of $0.4 \times 0.08$ )		
(d)	M1 for sight of $B(50, "0.032")$ ft their answer to (c) provided it is a probability $\neq 0.08$ may be implied by correct answer <u>or</u> sight of $[P(T \leq 3)] = 0.924348\dots$ i.e. awrt 0.924 or $P(T \leq 2)$ as part of $1 - P(T \leq 2)$ calc. A1 for awrt 0.785		
<b>MR</b>	Allow MR of 50 (e.g. 30) provided clearly attempting $P(T \leq 2)$ and score M1A0		

Qu 3	Scheme	Marks	AO				
<p>(a) Hectopascal <u>or</u> hPa</p> <p>(b) <math>\bar{x} = \bar{y} + 1010</math> <u>or</u> <math>\frac{214}{30} + 1010</math>  <math>= 1017.1333\dots</math> awrt <b>1017</b></p> <p>(c) <math>\sigma_x = \sigma_y</math> (or statement that standard deviation is not affected by this type of coding)  <math>[\sigma_y =] \sqrt{\frac{5912}{30} - ("7.13[33\dots])^2}</math> <u>or</u> <math>\sqrt{146.1822\dots}</math>  <math>= 12.0905\dots</math> awrt <b>12.1</b></p> <p>(d) High pressure (since approx. mean + sd ) so clockwise                      Locations are (from North to South): Leuchars, Heathrow, Hurn                       Wind direction is direction wind blows <u>from</u>                      So: Heathrow (<b>NE</b>) Hurn (<b>E</b>) Leuchars (<b>W</b>)</p>	<p>B1 (1)</p> <p>M1 A1 (2)</p> <p>M1 A1 (3)</p> <p>B1</p> <p>B1 (2)</p>	<p>1.2</p> <p>1.1b</p> <p>1.1b</p> <p>3.1b</p> <p>1.1b</p> <p>1.1b</p> <p>2.4</p> <p>2.2a</p>	<p>(8 marks)</p>				
				<b>Notes</b>			
				<p><b>FYI</b></p> <p>(a)</p> <p>(b)</p> <p>(c)</p> <p><b>Final answer</b></p> <p>(d)</p>	<p>1 hPa = 100 Pa; 10hPa = 1 kPa; 1Pa = 1 Nm<sup>-2</sup></p> <p>B1 for “hectopascal” <u>or</u> hPa (condone pascals, allow millibars <u>or</u> mb) o.e.                      Do NOT allow kPa <u>or</u> kilopascals <u>or</u> Pa on its own</p> <p>M1 for a strategy to find <math>\bar{x}</math>                      Allow an attempt to find <math>\sum x</math> that gets as far as <math>\sum x = \sum y - 30 \times 1010 [= 30\ 514]</math>                      A1 for awrt 1017 (accept 1020) [Ignore incorrect units]</p> <p>1<sup>st</sup> M1 for an overall strategy using the fact <math>\sigma_x = \sigma_y</math> (can be implied by correct <u>final</u> ans)  <u>or</u> for <math>\sum x = 30\ 514</math> and <math>\sum x^2 = 31\ 041\ 192</math> (both seen and correct)                      2<sup>nd</sup> M1 for a correct expression (with <math>\sqrt{\quad}</math>) (ft their <math>\bar{y}</math> to 3sf) allow awrt 146 for 146.1822..  <u>or</u> for correct expression in <math>x</math> can ft their <math>\sum x &gt; 30\ 000</math> or their answer to (b)                      A1 (dep on 2<sup>nd</sup> M1) for awrt 12.1 [Ignore incorrect units]                      Final ans of awrt 12.1 scores 3/3 <b>but</b> if they then adjust for <math>x</math> e.g. add 1010 (M0M1A1)</p> <p>1<sup>st</sup> B1 for at least one of these reasons (these 2 lines) clearly stated (may see diagram)                      Need “high pressure” <b>and</b> “clockwise” to score on 1<sup>st</sup> line                      Contradictory statements B0 e.g. correct N~S list but say “anticlockwise”                       2<sup>nd</sup> B1 (indep of 1<sup>st</sup> B1) for deducing the 3 correct directions either in the table or stated as above                      If the answers in table and text are different we take the table (as question says)</p>		