

Qu 5	Scheme	Marks	AO
(a)	$[P(H > 1.6) =] \ 0.091211... = \text{awrt } \underline{\mathbf{0.0912}}$	B1 (1)	1.1b
(b)	Need H and T to be independent or events $\{H > 1.6\}$ and $\{T < 300\}$ are independent	B1 (1)	2.4
(c)	$[P(T < 300) =] \ 0.124(2816...)$ Prob both is: $"0.0912..." \times "0.124..."$ $= 0.011335... = \text{awrt } \underline{\mathbf{0.0113}}$	M1 M1 A1 (3)	3.4 1.1b 1.1b
(d)	$\frac{16.3 - \mu}{\sigma} = -0.5244(0051...) , \frac{29 - \mu}{\sigma} = 1.2816$ (calc: 1.28155156...) e.g. $29 - 16.3 = \sigma("1.2816" - "-0.5244")$ $\sigma = 7.032115... = \text{awrt } \underline{\mathbf{7.03}}$ $\mu = 19.9876... = \underline{\mathbf{19.95}} \leq \underline{\mu} \leq \underline{\mathbf{20.0}}$	M1M1 M1 A1 A1 (5)	3.1a 1.1b 1.1b 1.1b 3.2a
(10 marks)			
Notes			
(a)	B1 for awrt 0.0912 (from calculator)		
(b)	B1 for a suitable reason mentioning or implying H and T are independent Allow: e.g. “they”/ “each event”/ “ $P(H)$ and $P(T)$ ”/ “the variables” and “independent” B0 for “the results” /”the values” are independent. Ignore other comments that are not incorrect or contradictory.		
(c)	1 st M1 for using model for T to attempt to find $P(T < 300)$ e.g. sight of 0.124 or better <u>or</u> sight of $\pm \left(\frac{300 - 330}{26} \right)$ or $\pm \left(\frac{5 - 5.5}{0.433...} \right)$ or $Z = \pm 1.15(3...)$ 2 nd M1 for multiplying their two probabilities together ft part (a) and their $P(T < 300)$ provided both values are probabilities. NB M0M1 is possible here A1 for awrt 0.0113 [Correct answer with no incorrect working 3/3]		
(d)	1 st M1 for standardising 16.3 and setting equal to z value where $0.5 < z < 0.6$ 2 nd M1 for standardising 29 and setting equal to z value where $1 < z < 1.5$ 3 rd M1 dep on 1 st or 2 nd M1 for solving their two linear eq’ns – reach an eq’n in one variable May be implied by sight of $\sigma = 7$ (or better) or $\mu = 20$ (or better) For 1st A mark we must also see one of – 0.5244 or 1.2816 (or better) <u>used</u> in their equ’ns OR both z values correct to 3dp i.e. – 0.524 and 1.282 1 st A1 for $\sigma = \text{awrt } 7.03$ (but see 3 rd case below) 2 nd A1 for $\mu =$ in $[19.95, 20.0]$ (i.e shouldn’t see something rounding down to 20.0) Allow 20 from equations with suitable z values (see examples below)		
NB	Use of – 0.524 and 1.28 [would give 7.0399... and 19.988...] and scores M3A0A1 Use of – 0.524 and 1.2816 [would give 7.033... and 19.99...] and scores M3A1A1 Use of – 0.5244 and 1.28 [would give 7.038... and 19.99 ...] and scores M3A1A1 Both z values correct to 3dp i.e. – 0.524 and 1.282 [should give 7.032 and 19.984] scores A1A1		