Daily Question Applied Day 1 Solution

Question Number	Scheme	Marks
(a)	[J = Journey time] $P(J < 20) = P\left(Z < \frac{20-25}{6}\right)$ {$= P(Z < -0.833\ldots)$}	M1
	$= 1 - 0.79767\ldots$	M1
	$= 0.202328\ldots$ awrt **0.202 or 0.203**	A1
		(3)
(b)	$(1 - \text{"}0.202328\ldots\text{"}) \times \text{"}0.202328\ldots\text{"} \times 2$	M1,M1
	$= 0.322783\ldots$ awrt **0.323**	A1
		(3)
(c)	$P(J > m) = 0.01 \Rightarrow P\left(Z > \frac{m-25}{6}\right) = 0.01 \Rightarrow \frac{m-25}{6} = 2.3263$	M1 B1
	$m = 38.95808726\ldots$ awrt **39.0**	A1
		(3)
(d)	More reliable suggests reduction of or smaller standard deviation	B1
		(1)
(e)	[X = new journey time so $X \sim N(25, \sigma^2)$] $P(X > 30) = 0.15$	M1
	$\frac{30-25}{\sigma} = 1.0364$	M1 B1
	σ = awrt **4.8**	A1
		(4)
		[14]

	Notes
(a)	1st M1 for standardising with 20, 25 and 6. Accept $\pm$
	2nd M1 for attempting $1 - p$ [where $0.5 < p < 0.8$]. Beware $1 - 0.83$ (or their z value) is M0
	A1 for awrt 0.202 (use of tables awrt 0.203) (Correct ans only 3/3)
(b)	1st M1 for $p(1-p)$ for any probability p
	2nd M1 for $2 \times$ a probability such that answer is also a probability
	A1 for awrt 0.323 or 0.324 [NB use of 0.202 will give 0.322 and lose this A mark]
(c)	M1 for standardising with m, 25 and 6 and setting equal to a z value $\lvert z \rvert > 2$
	B1 for $z = \pm 2.3263$ or better (calculator gives 2.326347877…)
	A1 for awrt 39.0 (allow 39 from fully correct working)
Ans only	For answer only in [38.9575, 38.9585] score 3/3 for awrt 38.98 score M1B0A1
(d)	B1 for suitable comment that standard deviation should be smaller
(e)	1st M1 for a suitable probability statement including the 30 and 0.15, may be implied
	2nd M1 for standardising with 30, 25 and σ and setting equal to a z value $1 < \lvert z \rvert < 1.5$
	B1 for $z = 1.0364$ or better (calc. 1.0364338…) If B0 for 2.32 or 2.33 in (c) allow awrt 1.04
	A1 for awrt 4.8
Ans only	For answer only of awrt 4.82 allow full marks, awrt 4.8 score M1M1B0A1 unless B0 for 2.32 or 2.33 in (c)