Question Number	Scheme	Marks
3. (a)	$[W \sim \mathrm{N}(64, 8^2)]$ $\quad \mathrm{P}(W < 51) = \mathrm{P}\left(Z < \dfrac{51-64}{8}\right)$ <u>or</u> $\mathrm{P}(Z < -1.625)$	M1
	$= 1 - 0.9484$ $\quad$ (calc. $1 - 0.9479187299\ldots$)	M1
	$=$ awrt **<u>0.052</u>**	A1
		(3)
(b)	Require: $\mathrm{P}(W > 49 \mid W < 51)$	M1
	$= \dfrac{\mathrm{P}(49 < W < 51)}{\mathrm{P}(W < 51)}$ <u>or</u> $\dfrac{\mathrm{P}(-1.875 < Z < -1.625)}{\mathrm{P}(Z < -1.625)}$	M1
	$= \dfrac{0.021684...}{\text{(a)}}$	A1ft
	$= 0.4163\ldots$ $\quad$ awrt **<u>0.42</u>**	A1
		(4)
(c)	$\left[\mathrm{P}(W > H) = 0.10 \Rightarrow\right]$ $\dfrac{H-64}{8} = 1.2816$	M1B1
	$H = 74.2528\ldots$ $\quad$ awrt **<u>74.3</u>**	A1
		(3)
		[10 marks]

Notes

(a)
1st M1 for standardising with 51(or 77), 64 and 8 (allow $\pm$) Implied by z = awrt $\pm$ 1.62/3
2nd M1 for $1 - p$ where $0.9 < p < 1$
A1 for awrt 0.052 (NB If they use $z = (\pm)$ 1.62 from correct standardising allow 0.053)
NB Calculator gives 0.0520812… [ans only of awrt 0.052 is 3/3]

(b)
1st M1 for a correctly stated conditional probability. May be implied by correct ratio.
2nd M1 for a correct ratio of probabilities in their W or Z (either version from scheme)
$\dfrac{\text{(a)} - \mathrm{P}(W < 49)}{\text{(a)}}$ <u>or</u> $1 - \dfrac{\mathrm{P}(W < 49)}{\text{(a)}}$ will score M1M1
1st A1ft for a correct ratio of probabilities with their (a) on denominator and numerator in the range [0.0215, 0.0219]. Num > Denom is A0
2nd A1 for a final answer of awrt 0.42 (dep on at least one other mark)
Final answer of $\frac{5}{12}$ will lose the final A1 unless awrt 0.42 is seen as well
Ans only For an answer of 0.416 or better award 4/4

(c)
M1 for standardising with H, 64 and 8 and setting equal to a z value where $|z| > 1$
B1 for using $z = \pm 1.2816$ (or better e.g. calc: 1.2815515…) can be with 8^2 instead of 8 etc
NB $\mathrm{P}\left(Z > \frac{H-64}{8}\right) = 1.2816$ can score M1B0 unless a correct answer implies 3/3
A1 for awrt 74.3 (calc gives 74.25241253…)
z = 1.28 award M1B0A1 for an answer of 74.24 or awrt 74.2 if B0 scored for $z = 1.28$
Ans only for an answer only of awrt 74.3 (can come from $z = 1.282$ etc) award M1B0A1
Ans only for an answer for H in the range $74.252 \leqslant H \leqslant 74.253$ award M1B1A1