Question	Scheme	Marks
5 (a)	$H_0 : \mu_A = \mu_B$ $H_1 : \mu_A > \mu_B$ oe	B1
	se = $\sqrt{\frac{17.8^2}{50}+\frac{18.4^2}{40}}$	M1
	$z = \pm\frac{1377-1368}{\sqrt{\frac{17.8^2}{50}+\frac{18.4^2}{40}}}$	M1
	$=\pm 2.339...$ awrt ± 2.34	A1
	One tailed c.v. $\lvert Z\rvert = 2.3263$ **or** CR: $Z \leqslant -2.3263$ or $Z \geqslant 2.3263$	B1
	In CR/Significant/Reject H_0	dM1
	Sufficient evidence to support that the mean **yield** from plants using fertiliser ***A*** is greater than the mean **yield** from plants using fertiliser ***B***	A1ft
		(7)
ALT	**finding the CI can get B1M1M1A0B1M1A1 unless test statistic given**	
	award M1 for $z = \pm\frac{D}{\sqrt{\frac{17.8^2}{50}+\frac{18.4^2}{40}}}$ dep on first M1 where $2.3 \leqslant z \leqslant 2.4$ May be implied by $\lvert D\rvert = 8.949$	
(b)	Expected profit per plant	
	A: $3\times1.377-\frac{75}{50}$ *B*: $3\times1.368-\frac{50}{40}$	M1
	A: £2.63(1) *B*: £2.85(4)	A1
	Claire should use fertiliser *B*	dA1 (3)
	Notes	**Total 10**

(a)	**B1**	Both hypotheses correct. Allow equivalent hypotheses. Must be in terms of μ If *A* and *B* not used the letter must be defined
	M1	For a correct attempt to find the se or se^2 Condone slip in sample sizes May be implied by se = awrt 3.85 or se^2 = awrt 14.8. Allow for a *p*-value of 0.0096 or awrt 0.0097
	M1	For an attempt to find *z* value. Allow slip in sample sizes and/or use of 17.8 and 18. 4 rather than 17.8^2 and 18.4^2 Allow for a *p*-value of 0.0096 or awrt 0.0097
	A1	awrt $=\pm 2.34$ Allow for a *p*-value of 0.0096 or awrt 0.0097
	B1	$\pm$ 2.3263 or better seen (Calculator gives 2.3263479…) must be compatible with their test statistic
	dM1	dep on previous dM1 awarded, ft their test statistic and CV only. A correct statement compatible with their test statistic and CV only – need not be contextual but do not allow contradicting non contextual comments.
	A1ft	ft their *z* value and CR only. A correct contextual statement compatible with their test statistic and CV with context of yield (at least once) and *A* and *B*
		NB id they give a *p*-value of awrt 0.0096/7 they could get B1M1dM1A1B0dM1A1
(b)	**M1**	A correct method to find the profit per *n* plants or *m* kg for either fertiliser *A* or fertiliser *B* $n\left(3\times1.377-{}^{75}\!/_{50}\right)$ or $n\left(3\times1.368-{}^{50}\!/_{40}\right)$ or $m\left(3-{}^{75}\!/_{50\times1.377}\right)$ or $m\left(3-{}^{50}\!/_{(40\times1.368)}\right)$ where n and $m\neq 0$ Implied by one correct value for *A* or *B*
	A1	must have 2 values which can be compared. ie using same *n* or *m*. Profit per *n* plant £2.63(1) *n* and £2.85(4) *n* or profit per *m* kg awrt £1.91 *m* and awrt £2.09 *m* (2dp) or cost per *m* kg awrt £1.09 *m* and awrt £0.91 *m* or number plants per £*y* awrt 0.38…*y* and awrt 0.35… *y* Useful numbers (*n* = 50 gives profit 131.55, 142.7) or (*n* = 40 gives profits105.24 and 114.16) gain M1A1
	dA1	dependent on 1st A1 being awarded. For a correct statement.