Question Number	Scheme	Marks
3(a)	$H_0: p = 0.35$ $H_1: p \neq 0.35$	B1
	$P(X \leq 8) =$ awrt 0.0303 or $P(X \geq 21) =$ awrt 0.0173 or $P(X \leq 20) =$ awrt 0.9827	M1
	$[P(X \leq 8) =]$ awrt 0.0303 and $[P(X \geq 21) =]$ awrt 0.0173	A1
	CR $X \leq 8$ and $X \geq 21$	A1
		(4)
(b)	0.0476	B1ft
		(1)
(c)	$H_0: p = 0.028$ $H_1: p > 0.028$	B1
	$Y \sim B(250, 0.028) \Rightarrow Y \sim$ Po(7)	M1
	$P(Y \geq 11) = 1 - P(Y \leq 10)$ or $P(Y \geq 13) = 1 - 0.973$	M1
	$= 0.0985$ or Critical region $Y \geq 13$	A1
	There is insufficient evidence to suggest that the <u>proportion</u> of sunflower <u>seeds</u> that grow to a height of more than 3 metres is now <u>greater</u> than 0.028	A1
		(5)

	Notes	Total 10
(a)	**B1**	Both hypotheses in terms or p or π
	M1	One of the correct probability statements. Implied by a correct critical region
	A1	awrt 0.0303 and awrt 0.0173
	A1	Both parts of the critical region given. Allow alternative notation e.g. $X < 9$ and $X > 20$ Do not allow as probability statements.
(b)	**B1**	For 0.0476 Allow awrt 0.0475 (calculator) or ft their **two** critical regions provided probabilities are seen in part (a) Common ft is for $X \leq 7$ and $X \geq 21$ gives 0.0297
(c)	**B1**	Both hypotheses in terms or p or π – If already lost the mark in (a) for incorrect letter allow any letter
	M1	Po(7) written or used
	M1	Writing or using $1 - P(Y \leq 10)$ or $1 - 0.9015$ or $1 - 0.973$ (May be implied by 0.0985) or may be implied by $Y \geq 13$ provided Po(7) seen or used If using N(7, 6.804) or N(7, 7) allow use of $1 - P(Y \leq 10)$ or $1 - P(Y \leq 10.5)$ B(250, 0.028) gives 0.09549… and implies M1 N(7, 6.804) gives awrt 0.09 (Calc gives 0.08983…) or awrt 0.13 (Calc gives 0.125…) and implies M1 N(7, 7) gives awrt 0.09 (Calc gives 0.09293…) or awrt 0.13 (Calc gives 0.1284…) and implies M1
	A1	awrt 0.0985 or CR: $Y \geq 13$ provided Po(7) seen or used (Allow any letter for the CR)
	A1	Independent of the hypotheses but dependent on the previous M1A1 being awarded. A correct conclusion in context. Allow amount/number for proportion, sunflowers for seeds and increased oe for greater. Ignore any non-contextual statements